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THE

UTURE OF SILVER

BY

EDUARD SUESS

Professor of Geology at the University of Vienna, Austria
Vice-President of the Imperial Academy of Science
Member of the Austrian Parliament, etc.

TRANSLATED BY ROBERT STEIN, U. S. GEOLOGICAL SURVEY

PUBLISHED BY PERMISSION OF THE AUTHOR AND BY DIRECTION OF THE COMMITTEE ON FINANCE, SENATE OF THE UNITED STATES

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PREFACE TO THE AMERICAN EDITION.

Some years after the introduction of the gold standard in Germany, which gave rise to so important movements, I published, in 1877, a small work, "The Future of Gold,"[1] wherein I tried to show that from geologic indications we must expect in the future a scarcity of gold and an abundance of silver, and that the extension of the gold standard to all civilized states is impossible.

The work on "The Future of Silver," which now earns the distinction of being published in the English language through the Finance Committee of the United States Senate, appeared in the spring of 1892, when the deliberations concerning the introduction of the gold standard in Austria-Hungary began. In the meantime many of the statements I had made in 1877 had been verified. The production of gold, owing to the exhaustion of rich fields, had fallen for several years; afterward, indeed, owing to the discovery of the Transvaal fields, it had once more risen, but at the same time an extraordinary increase in the consumption of gold by industry had occurred. Simultaneously there was noted an increase in the silver production, despite the falling price of silver, an increase which was mainly due to improvements in metallurgic processes. Argentina, Brazil, Portugal, Spain, Italy, Greece, amid vicissitudes of diverse nature, had lost their metallic circulation wholly or in part; nay even, in 1890, a time came when the strength of the Bank of England was not by itself equal to the emergency.

Under these circumstances many of my friends and myself were of opinion that Austria-Hungary, in order to guard herself against all contingencies, ought indeed gradually to acquire a moderate amount of gold, but ought neither to proclaim a gold standard nor establish a definitive ratio between the silver florin and the gold coin.

Our Government went much farther than we deemed advisable.

Meantime, in the beginning of 1892, the last great work of Ad. Soetbeer on this subject (Litteraturnachweis über Gold- und Münzwesen) had appeared, in which (for example, p. 285, 291) some of the arguments advanced against the exclusive gold standard are conceded. Mr. Soetbeer also honored me with letters in which he expressed his misgivings at the course of affairs and at the appreciation of gold. He regarded the endeavors of the bimetallists as impracticable, because of England's attitude, if for no other reason: but he was convinced that some measure must be adopted to check the fall of silver. On July 30 and 31, 1892, I had the pleasure of spending two memorable days at his house at Göttingen. On August 5 he sent out a memorandum containing his propositions. In their essential features these propositions required indeed the recognition of gold as the sole standard, but no state was to keep in circulation gold coins of less than 20 francs, 20 marks, 1 sovereign, or $10, nor any credit note below that value. The principal silver coins were to be recoined at a higher ratio than 15½; every government was to receive its own principal silver coins in payment to any amount, while the legal-tender quality of these coins for private payments was to extend to three times the amount of the gold coin (for example, to 60 francs). Fully covered certificates were to be issued on silver, but no credit notes.

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[1] Die Zukunft des Goldes. Von Eduard Suess. Wien und Leipzig, Wilhelm Braumuller, K. u. K. Hof- und Universitätsbuchhändler. 1877. The German edition of the present work, "Die Zukunft des Silbers," is published by the same firm. (Translator's note.)

As regards the ratio at which the principal silver coins were to be recoined, Dr. Soetbeer's views were not settled. In his last letter to me, dated October 7, 1892, he mentioned 22:1. Shortly after, on October 23, this excellent man, with his wealth of experience, departed from among us, in the 78th year of his life.

How the international congress rejected all propositions; how, in the year 1893, events developed with overwhelming rapidity, it is not now my purpose to relate. Soetbeer admitted that the effect of his propositions would be but transient, yet he saw no possibility of more radical measures. For a number of years, on the basis of geologic experience, the world has been warned that its entire monetary system is drifting toward an abyss. During the past year we have approached close to its edge.

E. SUESS.

VIENNA, AUSTRIA, *October 1, 1893.*

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PRELIMINARY REMARK.

The values of gold and silver are diverging even more rapidly than I predicted in my book, "The Future of Gold," in 1877. Hence I preferred in the present work to indicate the quantities of the two metals for the most part in figures of weight instead of in figures of value, 1 kilogram of fine gold being = 3,444.4 francs. The ounce is = ounce troy of fine gold = 31.1 grams = 107.1 francs; 1 pud fine gold = 40 Russian pounds = 16.38 kilograms = 56,419 francs.

CHAPTER I.

INTRODUCTION.

EARLIEST OUTPOURS OF GOLD FROM CALIFORNIA AND AUSTRALIA—MURCHISON—BARON VON HOCK AND M. DE PARIEU—HOCHEDER—WARNINGS—UNITY OF INTERESTS—LIMITS ESTABLISHED BY NATURE.

If in New York the ounce of fine silver sells for $1.2929, then the price of the silver in the dollar is said to be at par. At the moment I am beginning to write, the ounce of fine silver is quoted at $0.90 and $0.91, that is to say, the metallic value of the dollar is only 69.6 to 70.4 cents. As compared with gold, silver is depreciated to an extent without precedent in modern times.

Now there are short-sighted persons who regard this circumstance as a permanent success for those governments that are in possession of a gold currency; and the complete defeat of silver, and the impossibility of its ever regaining the full dignity of a medium of commerce, especially in Europe, are looked upon as demonstrated.

But this verdict is based on but a small portion of the multitude of facts bearing on the subject. It overlooks the fact that for millenniums the two metals, gold and silver, owing to certain properties by which one became the complement of the other, shared between them the solution of one of the greatest of economic problems; that in recent decades, with the enhancement of material well-being and commerce, this problem has become enormously extended and absorbs constantly increasing quantities of metal; and that the mistake by which the bond of union between the two metals was arbitrarily severed can not become more ominously manifest, for the world's economy and for peaceful progress, than by the divergence of the values of the two metals.

This divergence moreover is the very contrary of those assumptions under which some years ago the introduction of the gold standard was proposed and later on defended.

All commerce proceeded without disturbance as long as gold and silver stood to each other in a relation of value established partly by law and partly by usage. The first impulse toward unsettling this relation was given by the large shipments of gold that came to Europe from California and Australia after the year 1849. The world was startled; gold came in such abundance that it began to fall in value; voices were heard in Paris, proposing the complete demonetization of the metal, so unreliable in its production.

Even at that time geologists spoke to warn and to reassure. Murchison in 1854 wrote that, in view of the facts recorded in the crust of the earth, the fear that gold would remain permanently depreciated in comparison with silver, was entirely groundless. The flood of gold would abate as soon as the alluvial land was exploited. In fact it was yet to be proved that gold extended in workable quantity to any great depth. Veins of silver and veins of argentiferous lead on the other hand existed in abundance. The superficial dissemination of the gold and the deep extension of the silver were already indicated in Scripture (Job 28. 1).[1] In fact the inflow of gold began to diminish. In contrast with the previous plan, the demonetization of gold, the idea was now broached of using the existing gold for the creation of a single gold standard for the entire globe, and thereby putting an end once for all to the oscillations of the two metals. That was a fine and grand idea, and had it been practicable, it would most certainly have been a decided step in advance in the world's commerce. This idea in fact animated many excellent men; in Austria it inspired Baron von Hock; in France, M. de Parieu; and it fills the monetary discussions of the year 1868.

Not long before, the Austrian mining councilor, Hocheder, had returned from Brazil, where for many years he had been superintendent of mining. He had seen how numerous gold-vein mines grew so poor at greater depth that they could no longer be worked with profit, and he ventured publicly to question whether gold in any case continued to any great depth. The discussion of this question, in which Grimm in Przibram, Hans Höfer, Pošepny, and others took part, showed that gold had indeed been found in many veins down to considerable depths, but that it there occurred in a mineral combination which considerably increases the difficulty of production, and which, combined with the difficulties and expense always attendant on deep mining, very often renders the production of gold from such depths unprofitable. To this was added the old experience, made thousands of years ago, that gold appears only on the borders of civilized countries, that is to say, that the gold deposits of civilized countries are practically exhausted.

In the mind of every calm thinker the question should even then have arisen whether there really exists an amount of gold sufficient to establish a universal gold standard for the whole earth.

In Germany the gold standard was introduced. At that time it was thought that with the fall in the value of silver the production of silver from mines would decrease, and an equilibrium would thus be established. It was replied that the production of silver would not decrease; on the contrary, from the nature of the ores, from refining processes, and for other reasons, an increase in the production of silver was to be expected even with falling price. This increase, in fact, has taken place. It was said at that time that the quantity of tokens of credit was increasing from day to day at such a rate that a smaller and smaller amount of metal would satisfy the demands of circulation. In reply it was pointed out that on the contrary, with the increase of fiduciary values and at the same time with the development of general commerce the demand for metal must rise, and to what extent this proved true is shown by the experience of the Bank of England in 1890. The view that the requisite quantity of gold did not exist was sneered at. The sneers were soon hushed. One of the most gifted and influential advocates of the gold standard prophesied as late as 1876 that we are beyond question approaching a future when all lands would adopt the same metal as the basis of their currency. In view of the lessons learned since that time, that prophecy will not be repeated so far as gold is concerned, and yet, without the conviction that the single gold standard will be universal, its introduction in any limited area of the domain of commerce comprising the whole earth can have no other than a disturbing effect.

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[1] R. J. Murchison, Siluria, I ed. 1854, p. 411-458. On the original formation of gold, and its subsequent distribution in debris over parts of the earth's surface.

The prospect is—it was stated at the time—that after a few centuries, gold, becoming rarer and rarer, will be unable to maintain the economic position it has thus far occupied. The reply was: What has the practical statesman to do with future centuries? But Otto Arendt, Neuwirth and many others have shown in a striking manner what fateful significance the rising value of the standard metal has for a social organism.

The possibility of an international agreement unfortunately recedes more and more in the face of accumulating difficulties. The conditions of production both in agriculture and in industry in regions with falling standard depart more and more from the conditions in regions with rising standard. The steady increase and improvement in all the means of mental and physical intercourse has brought about a solidarity of all advanced nations which comprises not only their modes of thinking but also a large share of their interests. If in consequence of withdrawal of gold deposits the Bank of England raises its rate of discount, every great market of the earth knows it on the same day. The constant silver purchases of the American Treasury determine the level of hydrostatic equilibrium of the price of silver all over the earth. They influence the price of wheat in India, of silk in China, of the sugar that leaves Hawaii. And, as at times an epidemic sweeps over a continent and attacks all nations without regard to political boundaries, so we have seen economic crises spread with invisible power over whole continents, and a single state stand helpless in the presence of the destroying force.

With the divergence of the values of the two metals, the world's commerce approaches a great crisis.

Nature has bounded man's life on earth by certain conditions to which even the richest nation and the most powerful government must conform.

Modern physics has made us familiar with the peculiar limitation and restriction of the perceptive faculty of our organs of sense. If I enter into a dark room, in which there is a freely movable rod, and if I am able to make this rod perform any desired number of vibrations, I shall witness the following phenomena: As soon as the number of vibrations has reached sixteen per second, that is to say, with sixteen impacts against my tympanum, my ear perceives a deep bass note. With the increase in the number of vibrations the tone becomes higher and shriller, and at 40,000 vibrations my ear no longer perceives it. Everything is silent; the limit of perception of my ear has been exceeded. I feel heat radiating from the rod, but I hear it no longer. Only much later, when the number of vibrations has reached 450 billions per second, there begins the activity of another organ of sense, the eye. I see the rod; it shines with dark red color. The number of vibrations increasing, the luminous color runs through the series of the rainbow; at 800 billions it has reached the dark violet; darkness comes on once more; the limit of perception of my eye has been exceeded; whatever lies beyond remains unknown to me. Thus nature has set bounds to the faculty of hearing, below and above; and after a long interval she has opened to the eye a similarly bounded though much more extensive range. We fancy we perceive the whole outer world, and yet it is merely framed windows as it were that permit us to listen and to look forth out of ourselves.

Similar bounds to human activity have been set by nature in many directions. The gifts she offers are of many kinds, but they are limited in quality and quantity.

Experience gathered from the structure of the globe affords reason for the conjecture that heavy metals appear at the surface of the planet more rarely than lighter substances. On the whole, this conjecture is confirmed by the facts. Gold, platinum, iridium, and other metals, which are nearly twenty times or more than twenty times heavier than water, are without exception rare. It is a limited group of metals, the lightest of which is gold (19.253), that are designated as the "heavy" metals. This group is separated from the other metals by an interval, interrupted only by quicksilver (13.596), remarkable for its low melting point. Next follows the two metals thallium (11.9), and palladium (11.8), which are also as yet among the rarer ones; then in the order of their weights, and closely related also by the manner of their occurrence, lead (11.352), and silver (10.474). The great gap, beginning with gold, interrupted only by quicksilver, and ending with thallium, and the fact that silver lies beyond that gap, at once indicate that these two precious metals, gold and silver, are probably available in very different quantities.

Man can choose and utilize; but he can not effect changes except within rigidly drawn lines. Thousands of years ago, man chose metals for his currency. Copper, silver, and gold are so conveniently associated by their useful properties that three zones of currency have been formed, more or less sharply bounded but yet practically contiguous. Platinum came into use temporarily; it is not available in sufficient quantity. Nickel has been used by some states, but the intercalation of a medium between copper and silver has in most countries been found unnecessary.

Now the limits of the three principal zones are determined and prescribed by the quality of the metals. Let us take an example. An attempt was made to put a gold coin into circulation in place of the silver 5-franc piece; the attempt failed. The gold 5-mark piece, too, refuses to remain in circulation.

For it must be observed that the volume of a gold coin as compared to a silver coin of the same value is determined not merely by the legal ratio, say 1:15½; besides the absolute weight of the gold coin, of fixed relation to silver, the volume is also determined by the much higher specific gravity of gold. The one-tenth of copper alloy, which both, as a rule, contain, will be in the gold coin $\frac{1}{15.5}$, both of the weight and of the volume of the copper alloy of the corresponding silver coin. Now since the specific gravity of gold is to that of silver as 19.253 : 10.474, that is to say, almost as 2 : 1, the volume of the gold ingredient is about the thirtieth part of the volume of the corresponding silver ingredient. For this reason the 5-mark and 5-franc gold pieces are so small as to become unhandy, and therefore, up to that level, despite all edicts of lawmakers, silver coin always remains in use.

But, just as in the selection of coins to be issued, the lawmaker is tied down by the quality of the metals, so in determining the metallic basis of his currency, he is tied down by the mode of occurrence and manner of production of the metals.

The present development of the conditions of currency in Europe is in contradiction with the geologic conditions under which the metals occur. The warnings remain unheard. Let us now attempt to trace out some features of this unnatural development of things.

CHAPTER II.

RECENT EXPERIENCES IN THE EXTRACTION OF GOLD.

THE SULPHIDES—THE GOSSAN—THE ALLUVIAL LAND—PHASES OF MINING—DIFFICULTIES WITH THE SULPHIDES—CALIFORNIA—AUSTRALIA—RUSSIA—TRANSVAAL.

The lodes and veins which carry gold exhibit this metal at some depth almost always in combination with sulphur metals, and especially with pyrite. There are lodes in which gold and silver occur together, as in Hungary and Transylvania. The great Comstock lode in Nevada, too, belonged to this group. Even in these lodes sulphur compounds play a prominent part, although, as will be seen later on, when silver predominates, antimony and arsenic often assume importance as companion metals.

This deeper zone of the lodes of noble metals is designated as the zone of the sulphides or sulphur metals (pyrite group).

In the higher horizons of one and the same lode there is observed, as one approaches the surface, a different condition of the orés, or, more correctly speaking, the sulphur metals of the deeper portions have been decomposed and altered by external influences from the surface down to a greater or less depth. Such a zone of decomposition, in some cases, has been eroded and is hardly visible; in other cases it extends some hundreds of feet down into the lode. In some cases its lower limit is marked by the level of subterranean water, as in many Australian mines; in other cases its lower limit is irregular and indefinite.

The condition of these higher parts of the lode is different in gold lodes from what it is in silver lodes.

In gold lodes the pyrite is decomposed; the quartz, which forms the principal mass of the lode, is rusty brown in color, and, in fissures and cavities, is traversed by veins and nests of various iron compounds, resulting from the decomposition of the pyrite. Among them are seen larger and smaller quantities of free gold, now in grains or in larger kidney-shaped or rounded bodies, the so-called nuggets, now again as crystallized gold.

In the outcrop of those lodes that yield gold and silver, free gold is found, together with black chlorine compounds of silver; in the Comstock lode free gold was extracted for some time before anyone recognized the value of the rich black silver ores.

This uppermost altered zone of the ore lodes is called by the German miners the "hat," by the Englishman the "gossan."

The surrounding rock is weatherd and carried off by water or tumbles down the slope; the gossan crumbles off, and, with its free gold, its brown colored quartz, and with the harder parts of the adjoining rocks, forms the auriferous alluvium. This is the third zone of occurrence. Silver does not form rich alluvial land; only platinum and tin share this quality with gold.

The separation of the zones of the sulphur metals, the gossan and the alluvial land, indicates also the three phases that may be distinguished in the extraction of gold. This extraction, of course, moves in the opposite direction. First the alluvial land is exploited quickly, without great appliances, and with large profit. Next follows mining, first on the gossan. The free gold is stamped; comparatively simple amalgamation permits its extraction. On the alluvial land there is as yet a chance for individual work, unless there is question of great hydraulic works, as in the working of the alluvial land of California. On the gossan there is already need of capital, of a certain amount of investment, generally supplied by a company. It extracts the free gold; expenses are not too great; dividends are paid; everybody is satisfied. But now the sulphides begin to increase; water begins to enter; new machines are required; the product of the amalgamating works becomes less. The sulphides demand an entirely different treatment, such as chlorination, to make them part with their gold. That is the crisis. Woe to the investor who now buys the works on the basis of their previous average yearly product; disappointment is then inevitable. This moment of transition from the gossan to the sulphur metals is to the mine the time of severe trial. If the lode is rich and thick, if new capital is found, then new works are erected, the water is brought under control, and the work continues. Its returns have become less but steadier.

But even steadiness has its limits, and the returns depend on the power of machinery. Not long ago the Kaiser Josefi tunnel in Schemnitz was opened; it drains a large part of the works; a century's labor had been spent on it, and it is a good, proud, useful work. But that is not the scale to be applied to the present works in the rich gold and silver mines of America and Australia. There the most powerful steam engines stand above shafts which in the shortest time have been driven to a depth of 1,000 to 2,000 feet; in the depth of the mine, the motor, driven by compressed air, forces the diamond drill into the rocks to make room for the cartridge, filled with explosives of a power undreamed of in former days, and several of these cartridges are discharged at the same time by the electric battery. Even from the poor sulphur metals dividends are to be paid; higher wages are paid; shares are issued, and with irresistible force the crosscuts push forward; for miles the subterranean galleries extend; whole forests of timber are piled up in the cavities of the honey-combed ore bodies. The greater the force the greater the profit—the nearer also the end.

Only fifteen years ago it might be said that the output from the alluvial land was rich but transient, while the output of the lodes was poorer, often unprofitable, but more constant. Improvements in the chemical and metallurgic processes have since then rendered many an ore workable which formerly did not pay. But on the other hand the improvements in mechanical contrivances and in mining proper have caused the subterranean work to be accelerated to such extent that the life of each work has been shortened. For even the richest ore deposit contains only a limited amount of gold in accessible form.

It must be admitted that the free gold in the gossan is of different quality from that which occurs farther down in the lode combined with the pyrite. The gold of the gossan contains far less silver than that of the deep portions; often it contains hardly 1 or 1.5 per cent, while in the gold of the deep portions in the same lode there may be 10 to 12 per cent. The gold in the gossan also occurs in much larger grains and nuggets; at times nuggets of considerable size have been found in the gossan while they are never found in the sulphides. Finally, free gold occurs in the gossan also as a coating on fissures and at times in crystals.

From this it appears that in the gossan, together with the decomposition of the pyrite, there must also have occurred a solution and redeposition of the gold. Although this view met with opposition some years ago it may now be regarded as demonstrated by experience.[1]

Far less clear is the mode of occurence of the gold in the sulphides. In Treadwell mine, Alaska, Dawson found the main mass of the ore-bearing lode to consist of quartz, white feldspar, and a little calcspar; some parts assume the characteristics of a true granite. The lode is mined by open cut; part of it contains free gold, another part shows pyrite. But the microscopic examination of the rock by F. Adams shows that the pyrite itself is a secondary infiltration into cracks of the gangue, as, for example, into clefts between crushed crystals of feldspar. In this pyrite lies the gold and appears in the midst of the crystals of the pyrite as inclosed foreign bodies, which, it is true, are exceedingly small.[2]

On the other hand, it may be assumed as probable in many cases that this gold of the depths is combined not only with a large amount of silver but also with other metals, such as tellurium and especially bismuth. This, according to Pearce's observations, is true for several very remarkable occurrences in Colorado, and the gold bars coming from Australia are said to contain in some cases perceptible quantities of maldonite (gold bismuth).[3]

To extract this gold, contained in exceedingly small particles in the sulphides, is the difficult task of the metallurgist as soon as the mine has passed through the gossan. For this purpose various processes have come into use in recent years, involving mostly treatment with chlorine gas or addition of sodium chloride (table salt), and many improved variations of the older processes of Plattner and Patera. At first it was thought that these processes of chlorination yielded better results for silver than for gold,[4] but the minute investigations of Prof. Christie, confirming the older works of Austrian and German metallurgists, seem to have hit the essential point. These investigations show that in roasting, even at red heat, gold is not volatilized, while silver is volatilized in considerable quantities; but that upon the addition of chlorine, either in the form of gas or of salt, there ensues at once volatilization of gold also, so that this volatility of the chlorine compounds of gold may induce great loss.[5]

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[1] The question was discussed from various aspects by Genth, Amer. Jour. Science, 1859, XXVIII, p. 253–255; Selwyn, Quart. Jour. Geol. Soc., 1860, XVI, p. 146; Burckhardt, Neu. Jahrb. f. Min., 1870, p. 162; Ross, Raymond, Rep. on Mines, 1870. p. 63; Trautschold, Zeitchr. deutsch. geol. Ges., 1875, XXVII, p. 705; Egleston, Trans. Amer. Inst. Min. Eng., 1880, VIII, p. 452, and The Formation of Gold Nuggets and Placer Deposits, 8vo, New York, 1881; Stelzner, Neu. Jahrb. f. Min., 1883, II, p. 199; Arzruni, Zeitschr. d. geol. Ges., 1885, XXXVII, p. 890; Posepny, Genesis d. Metallseifen, Oest. Zeitschr. Berg- u. Hüttenwes. 1887, XXXV; E. Cohen, Entstehung d. Seifengoldes, Mitth. naturw. Ver. Neuvorpomm. u. Rügen, 1887, XVIII; Helmhacker, Beiträge z. Kenntn. d. secundären Goldlagerstätten, Berg- u. Hüttenm. Zeitschr., 1891, L, No. 37–40; C. Doelter, Einige Versuche üb. die Löslichkeit d. Minerale, Tschermak's Min. Mitth. herausg. v. Becke, 1890, N. Folge, XI, p. 328; and in many other places.

[2] G. M. Dawson, Notes on the ore deposit of the Treadwell mine, Alaska, and Frank D. Adams, On the microscopic character of the ore, etc, American Geologist, 1889. pp. 81–93. A notable feature are, for example, the photographic reproductions of thin sections of Californian gold quartzes, published by W. M. Courtis in Trans. Am. Inst. Min. Eng., XVIII, 1890, p. 639.

[3] Richard Pearce: The Association of Gold with other Metals inthe West. Trans. Am. Inst. Min. Eng., New York, 1890, XVIII. pp. 447–457.

[4] For example, Engin. and Min. Jour., New York, April 27, 1890, p. 390.

[5] Sam. B. Christy: The Losses in Roasting Gold Ores and the Volatility of Gold. Trans. Am. Inst. Min. Eng., New York, 1889, XVII, pp. 3–45. The loss is greater if salt is added to the roasting ore later than if it is added at the beginning. In a great chlorination work in California in 1882 the loss in roasting rose to 49.58 per cent, or almost half the gold, and 28.28 per cent of the silver.

In this way the robbing empiric processes of gold extraction of former days, which confined themselves to stamping and more or less imperfect amalgamation, have in the course of recent years been replaced, step by step, by serious scientific observation. Especially in the case of the figures of the American production there can be no doubt that their still comparatively high amount is due not to the discovery of new deposits nor to greater richness of the old deposits, but solely to improvements in metallurgic processes. Already there are works which guarantee to the mine owner who brings sulphides to them for treatment, 90 per cent of the gold shown in the assay. Without these astonishing improvements the working of the lodes, in view of the rapidity of mining, would even at this day be for the most part unprofitable; that is to say, after passing through the gossan and reaching the sulphides most of them would have been forced to stop working.

CALIFORNIA.

Since the production of Nevada declined, California once more heads all the rest of the United States as a producer of gold, with $12,500,000. The three phases of mining, alluvial land, gossan, and sulphides, present themselves there very distinctly.

Forty years ago California showed an annual production of gold of more than $60,000,000, and Australia nearly as much. That was the time of the great profits from the alluvial land. There are yet living in both countries witnesses of the unheard-of events of those days, and Dan De Quille has recently drawn a graphic picture of the old Californian prospector, who still nowadays, the worn-out blankets on his back, the revolver in his belt, the gray hair fluttering in the wind, a veritable wandering Jew, sniffing treasures, roams about the country, seeking the traces of the ruined cities which at that time had sprung up as by magic in the wilderness.

"For untold ages, before the foot of the first white man pressed the soil of California," says De Quille, "Dame Nature had been playing miner in all the mountains of that country. Countless millions of tons of auriferous gravel and earth had been sluiced down through every gulch, canyon, creek, and river that crossed either the channels of the old dead rivers or veins of gold bearing quartz veins. The first comers found little to do but to help themselves to the gold which the mining processes of nature had stored up. However, in a few years these heaped hoards of nature were exhausted, but this fact the genuine old-time prospector can not be brought to believe even to this day. All can not be gone; he will not hear that said. He still believes that somewhere a great hoard of golden nuggets is reserved for his special benefit. Having feasted from the golden fleshpots of the old days, he can not content himself with the hermit fare of these frugal times. If there is nowhere still a golden treasure to be unearthed, then his occupation is gone; he is ready to lie down and die."[1]

Forty years ago was the time of intoxication and extravagance. Bottles of champagne were set up as ninepins; mirrors were pelted with pieces of gold. But so great finds infatuated the finders to such extent that almost without exception they came, unsatiated, to a wretched end. Comstock, the discoverer of the great lode called after him, is a well known example. On the alluvium of California and elsewhere it was the same thing. The discoverers of the rich Cariboo deposits in

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p.[1] Dan De Quille, The old Californian prospector; Eng. Min. Journ., New York, November 11, 1891, 567.

British Columbia were a Prussian, named Dietze, and a Scotchman, named Rose. They journeyed ever onward, as often as the train of gold diggers had followed them, restless and undaunted. The Scotchman disappeared; later on, his body was found in the wilderness; on a branch hung his drinking cup, and engraved on it with a knife was his name and the words: "Dying of starvation." Dietze returned poor and in broken health, and afterward lived in Victoria on the charity of others.[1]

In California the exploitation of the younger alluvium was followed by the hydraulic work in the older alluvium. But the amount of loose drift and soil carried into Sacramento river was so great that the farming population made objection. Hence the figures of the production of California from recent years comprise, first, the last remains of work on young alluvium; second, the product of the hydraulic works, which varies with the status of the struggle between hydraulic works and agriculture, and with the amount of water at hand; and, third, the product of the work in the gossan and in the commencement of the sulphides of the lodes.

In the beginning, that is to say, after 1849, the production of California was estimated at 60 to 63 millions a year. All this came from the alluvium. In 1874, for the last time, it was over 20 millions; in 1879 and 1880 it was 17.5 millions, and at that time the excellent geologist Whitney, in his work on the auriferous gravels of California, estimated the production from these gravels still at 12 to 14 millions. That was in the main already hydraulic work, and the remainder came from the lodes. Even at that time Whitney remarked that the nuggets of the alluvium could by no possibility have been brought from afar, but that the strata which furnished these nuggets must have been richer than the present lodes. The richest parts of the gossan have in fact been removed to form the alluvium.[2]

In 1885 a well informed and unbiased observer, Prof. E. Reyer, of Vienna, visited all the more important ore deposits of California. The hydraulic works already at that time worked annually 40 millions of cubic meters of auriferous gravel; about 100 millions of it lay in the valley of Feather River and in that of the Sacramento. The farmers had already raised objections; the courts had imposed on the hydraulic works the condition, incapable of fulfillment, of keeping back the débris by barring the valleys. Reyer finds that all the lodes grow poorer going down. From 1850 to 1852 the contents of the most important gold quartz veins had been 30 to 800 marks per ton; 1860 to 1870, as much as 100; 1874 to 1875, 40 to 80; 1880, 24 to 90. Most of the veins, as soon as active exploitation has been commenced, are exhausted in a decade; only in exceptional cases do they last more than two decades.[3]

In the spring of 1889 a report by F. C. Hand stated that in southern California nearly all the auriferous lodes had reached the zone of the sulphides. In many cases, owing to ignorance of this circumstance, large mills had been erected for the extraction of free gold, but as soon as the water line had been reached, and the sulphides appeared in greater abundance, the amalgamating works yielded less and less, until the owners were reduced to the alternative of either abandoning the works or deciding upon the erection of new and expensive plant.[4]

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[1] Milton and Cheadle: The Northwest Passage by Land. 3d ed., 1865. pp. 364, 371.

[2] J. D. Whitney: The Auriferous Gravels of the Sierra Nevada of California, 4to atlas, Cambridge, Mass., 1880, p. 351, 352, 359.

[3] E. Reyer: Ueber die Goldgewinnung in Californien. Zeitschr. f. Berg-, Hütten- u. Salinenwes. XXXIV.

[4] F. C. Hand: Eng. and Min. Journ., New York, March 16, 1889.

The efforts of the engineers are extraordinary. More than 100 miles is the length of the Amador Canal, which carries the water along the Mother Lode to the transporting and extracting works. The Big Bend tunnel, Butte county, 4 kilometers in length, 3.15 meters broad, carries off underground the water of Feather river in order to permit the exploitation of the auriferous gravel in its dry bed, and the fall thus obtained serves for the production of electric light, which permits work at night.[1] Yet the figures of the production of California do not rise.

AUSTRALIA.

Among the Australian provinces Victoria has always held the great preeminence as a producer of gold. It was its production that led to the high figures which placed Australia close to the United States of North America in the gold tables. Already in 1877 the conjecture might be made that the decrease in the gold production of Victoria was due to the actual depauperation or exhaustion of the ore sites, and not, as imagined by the optimists of the country, to subordinate and transient circumstances.[2] Experience has confirmed this conjecture.

In 1851 Victoria had produced 212,899 ounces; in the next year, 1852, the figure rose to more than tenfold, namely, to 2,286,535, and, rising continually, reached in 1856 the extraordinary amount of 3,053,744 ounces. From that point commences the decline. Up to 1861 the figure continued above 2,000,000, up to 1875 above 1,000,000; then it fell steadily, being—

	Ounces.
1888	634, 620
1889	614, 838
1890	588, 560

The provisional figure for 1891 shows a slight rise as compared with 1890, being 621,986 ounces.

This steady deline of the gold production was so severely felt in the country that the attempt was made to give State aid to the gold works. £80,000 were annually appropriated for prospecting, but the official reports show that the results were very scanty, and allow one to guess readily that it was not in all cases the public interest which profited by some of the applications of the "prospecting grant."[3]

The secretary of mines, reporting another decline by 26,278 ounces at the end of 1890, adds: "This decrease appears to be mainly in alluvial gold. To some extent this must be expected as the natural result of the exhaustion of the more superficial deposits. During thirty years past, the whole of Victoria has been more or less searched for auriferous alluviums. These deposits, wherever occurring in considerable amounts and at moderate depth, have been very generally searched out and worked. Each year, during the continuance of the prospecting grant, similar prospecting has been carried on, and we must, though reluctantly, conclude that unless in more or less inaccessible localities, or at more considerable depths beneath the surface, the harvest of alluvial gold has been gathered in." After further remarks, in which the hope is expressed that deep-lying leads may yet be discovered, for instance, below the basalt sheets north of Ballarat, the secretary of mining expresses the view concerning lode mining that, thanks to the steady improvement in the treatment, the loss of gold had been diminished, and hence the annual decline in production was not so pronounced. "Nevertheless," he adds, "it must now, I think, be fully recognized that, as a natural consequence, the aggregate quantity of gold obtained from the mines of the colony will be less each succeeding year; but the decrease may be minimized by the successful exertions of combined scientific and technical knowledge." He expresses the hope that advances will be made in the methods of treatment.[1]

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[1] E. Purtscher: Oesterr. Zeitschr. f. Berg- u. Hüttenwes., 1890, Beilage, p. 37.

[2] Zukunft des Goldes, p. 289. The numbers given here are almost all somewhat higher than those given then; I follow the more recent statements of the mining registrars.

[3] Victoria: Ann. Rep. of the Secretary of Mines for 1889, Melbourne, 1890, p. 14.

Queensland was later in taking rank in the list of gold-producing states; the beginning of large works can only be reckoned from the year 1862. In 1877 the output reached the figure of 428,104 ounces, of which a large part came from lodes. In 1878 the figure declined to 310,247, then again to 212,783 in 1883. Thenceforward it begins to rise again; in particular, from 481,643 ounces in 1888 it makes a bound to 739,103 ounces in 1889, to decline again to 610,587 ounces in 1890. In 1891 it was 559,392 ounces.

The sudden rise in wealth in 1888 was brought about by the discovery of the rich deposit on Mount Morgan; this sufficed to maintain the total production of Australia for a short time at the same level, despite the decline in other provinces; but the extraordinary decline of 99,443 ounces, which Mount Morgan showed in 1890, and which was further swelled by 80,000 ounces in 1891, is not a favorable omen for the future.

Mining on Mount Morgan is carried on partly in open cut and partly underground, in a formation which bears essential characteristics of a great gossan, whose downward continuation, however, is questionable. The place lies southwest of Rockhampton, in the central part of Queensland. I follow the description given by T. A. Rickard.[2]

Mount Morgan rises about 500 feet above the village at its foot. On its summit, in an open quarry, about 1,200 to 1,700 tons of ore are quarried every week, and during the few years that the quarry has been worked already a considerable part of the mountain has been removed. At the time of the visit (1890) this open-cut mining was practiced in five benches, each 30 feet high. From the second bench a shaft 206 feet deep had been sunk, and this was connected with the main gallery, Freehold Tunnel, which was 789 feet long. At right angles to Freehold Tunnel was gallery No. 1, driven from the south side, 33 feet lower than Freehold and 155 below the lowest open cut; it was 1,070 feet long, but with materially different result. A still lower gallery, Sunbeam, had been begun.

Furthermore, at the height of the deepest open cut there is the shorter gallery, No. 2.

The rich rock on the summit of the mountain is quartz, now grey-blue and hard, now white and of vesicular, almost foamy consistency, traversed by hematite rich in silica and by hard black iron ore in lumps and veins; there is also some brown quartz and limonite. The gold is found as free gold in larger and smaller, even minute, particles both in the quartz and in the limonite. Veins of feldstone traverse the whole.

The uppermost gallery, No. 2, traverses the ore-bearing rock for 356 feet toward the north (deducting 26 feet for a lode of feldstone) and in a cross-cut for 310 feet toward the east.

Freehold Tunnel traverses first 180 feet of decomposed rhyolite, then

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[1] Victoria: Ann. Rep. for 1891, p. 7; still more decided and discouraging is the judgment of the state geologist, Murray, in Rep. of the Mining Registrars for the quarter ending June 30, 1889. Appendix A, pp. 72-76.

[2] T. A. Rickard, The Mount Morgan Mine, Queensland; Trans. Amer. Instit. Min. Eng., 1891, XIX.

40 feet of pyrite-bearing quartzite, then 180 feet of barren doleritic rock, finally 397 feet of the rich rock.

Gallery No. 2, which, as has been said, lies only 33 feet lower than the preceding, shows a considerable predominance of the barren rocks and of the pyrite-bearing quartzite; only 25 feet of its whole length belong to the rich rock.

The rocks rich in gold, therefore, decrease very rapidly downward. While their extent in the outcrop far exceeds that of an ordinary ore lode, they are not seen to be continued downward into a lode. Despite their resemblance to a gossan, there is seen below them, instead of a fissure filled with auriferous sulphides, a barren eruptive rock and the pyrite-bearing quartzite. Whether the deposit of Mount Morgan was developed out of the quartzite by transformation can not be judged by the reports at hand; still less can it be determined whether this quartzite would prove remunerative.

In 1886 the mining had been organized on a million shares at £1 a share; in 1888, when the great open-cut was taken in hand, their value was £17 5*s*.

The output of Mount Morgan was:

	Ounces.
1889	340,669
1890	226,240
1891	146,000

At the same time, toward the end of 1891, the value of the original capital fell from £17,500,000 to £2,000,000.[1]

The decline in Mount Morgan would have been still more apparent in the tables of the Australian production for 1890 had there not been at the same time a rise of 8,782 ounces in the gravels of Queensland. It may be observed by the way that the work on these gravels has almost entirely ceased in the course of the last few years, their total product in 1890, including the rise, amounting to only 13,826 ounces.

New South Wales attained its maximum already in the year 1852 with 818,751 ounces, fell at once to 548,052, to 237,910, and 171,367 ounces, rose once more in 1863 to 610,622 ounces, stood in 1875 for the last time above 200,000 ounces, and in its decline, with the exception of 1888, showed figures still always above 100,000. The most recent years showed:

	Ounces.
1886	101,416
1887	110.288
1888	87,503
1889	119,759
1890[2]	127.760

West Australia yielded, in 1890, 22,806 ounces, South Australia 15,000 ounces, and Tasmania 20,510 ounces; none of these countries rose in importance in the course of years. The Yilgarn district in South Australia, which yielded the greater part of the above-named amount from quartz veins, was expected to induce the building of a railway into the desert, but it seems that there was a lack of water in that district.

The output of New Zealand attained its greatest figure in 1863 with 628,450 ounces, declined with oscillations, remained from 1874 to 1880 almost without exception above 300,000, till 1889 still above 200,000 ounces and in 1890 was only 193,193 ounces.

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[1] The Economist, Nov. 7 1861 and elsewhere.

[2] New South Wales, Ann. Rep of the Dep. of Mines for 1890, Sydney, 1891, p. 14; the mint seems to think that the output was somewhat higher; Ibid. p. 23.

For 1891 I have as yet merely an approximate figure embracing all Australia; it is the balance sheet of the mints of Melbourne and Sydney. These received in 1891, 1,592,319 ounces of gold against 1,593,350 ounces in the preceding year, and issued in coins and bullion £5,976,047 as against £5,923,019 in the year 1890.

At the same time with my work on this subject there appeared in 1877 a most searching and instructive description of the Australian gold occurrences by G. Wolff, which has been regarded by Deputy L. Bamberger, in Berlin, as a refutation of the statements I had made at that time.[1] Not long after, Mr. Ulrich, the government geologist of New Zealand, in opposition to me, predicted a favorable future for the gold production of Australia.[2] Both Wolff and Ulrich are excellent specialists, but only the experience of years was able to show whether their judgment was not influenced by too lively a desire to see those countries develop quickly and favorably for whose explorations they had done such excellent work. For it is an old and general experience that the more profound a knowledge a geologist has of a country, the more ardent will be his affection for it.

My study was based on 1874 (55,819 kilograms) and 1875 (53,353 kilograms); in 1890 Australia gave 45,767 kilograms. Nature pursues its paths inexorably.

RUSSIA.

The Russian gold production began about 1814 with low figures, rose continuously, attained from 1877–1880 a maximum of more than 40,000 kilograms, and since then has maintained itself at the height of about 30,000 kilograms down to the present time. In the most recent time it even shows a slight rise. This production consists almost entirely of alluvial gold. The amount is stated rather variously in various writings, which is due to the circumstance that at one time only the crude gold of the alluvium is stated, at another time only the entire crude gold, at another time only the fine gold of the refining works, at another all the fine gold. In order to perceive the difference, it suffices to cast a glance at the excellent official tables of the Russian mining production, published by Kulibin, whose publication unfortunately has advanced only to the close of the year 1889.

The product of the works of 1889, according to these tables, shows the following amounts (in puds at 40 pounds, 1 pud=16.38 kilograms):

	Puds.	Pounds.
Crude gold from the gravels	2, 102	13
Crude gold from lodes	172	6
Total of crude gold	2, 274	19
Of this there was forwarded to the refining works ligature gold	2, 200	24
From this there was produced fine gold	2, 007	27
Add fine gold produced from silver ores	14	36
Total of fine gold	2, 022	23

(In kilograms: 33,130.)

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[1] Gust. Wolff, Das australische Gold, seine Lagerstätten und seine Associationen; Zeitschr. deutsch. geol. Ges, 1877, XXIX. p. 82–183; L. Bamberger, Das Gold der Zukunft; Deutsche Rundschau, herausg. v. Rodenberg, IV, Berlin, Oct. 1877. p. 151.

[2] G. H. F Ulrich, Die Zukunft der Goldausbeute in Australien, Brief an G. v. Rath; Neu. Jahrb. f. Min. 1879, S. 347–356.

According to Kulibin's statements the total of fine gold is calculated for the last five years at—

	Kilograms.
1885	28,137
1886	28,172
1887	31,086
1888	31,491
1889	33,130

showing for these five years a rise of 5,000 kilograms. The output for 1890 is put by the Russian mint at 31,841 kilograms.[1]

When in 1877 I attempted a review of the state of the Russian production I had at hand reliable figures only down to 1874, and in 1871 there had still been an output of over 39,000 kilograms. The result to which I was then led was that the steady and still very hopeful results of the washings were due to the great extent of the region, to the gradual opening up of new areas, and to the advance of the works toward the east.[2]

New discoveries in east Siberia led to a further rise in the output, especially in the years 1877 to 1880, in which, as has been said, the production of fine gold was more than 40,000 kilograms. But even this rise did not restrain Alfred Striedter, in 1883, from stating, at the close of a minute presentation of the state of affairs and on the basis of figures extending to 1880, his opinion that the climax of that production was not far off.[3]

In the following pages, in order to show the recent course of the production, I will start from my review carried down to 1874, join to it Striedter's digest extending down to 1880, and, with the five years, 1876–1880, principally considered by Striedter, compare the last published five years, 1885–1889 of Kulibin's tables.

Only the regions of importance will be discussed. All figures are given in crude gold; only in this form can they be obtained from the districts.

The Russian gold production falls into three great branches: Ural, West Siberia and East Siberia. Mining has always remained of small amount as compared to the yield of the gravels, forming 7.5 per cent of the total production in 1889. But as the product of mining belongs almost entirely to the government of Orenburg, the figure of the Ural production thereby gains somewhat greater steadiness.

According to Striedter's calculations, from 1814 to 1880 the Ural yielded 27.6, West Siberia, 6.4, and East Siberia, 66 per cent of the total output. At the time of greatest productivity, in the years 1876–1880, the proportion was 20:6:74.,

In the years 1885–1890 these figures once more returned close to the general average of 1814–1880; they were 28.75:7:64.25. East Siberia always appears as by far the most important, but also as the most variable element.

The Ural region showed somewhat greater constancy even as regards the alluvium. Perm in 1889 yielded 345 puds and Orenburg 149 puds. True, Kulibin remarks that in Orenburg the sands are beginning to show depauperation, and the end of the works is approaching, nay, that even in Perm, despite the rising output the traces of depauperation are already perceptible in the alluvial works. Of lode gold, Perm yielded in that year 41 puds; Orenburg, 105 puds.

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[1] For example, in the report of the Director of the United States Mint, Mr. Leech, for 1890–'91, p. 251 Newspapers mention 2,405 puds 37 pounds, probably crude gold, which, converted at the same proportion, would give about 35,000 kilograms of fine gold.

[2] Zukunft des Goldes, S. 263, 325.

[3] Alfr. Striedter, Russlands Goldproduction; C. Röttger's Russ. Revue, XXIII, St. Petersburg, 1883, p. 97–134 and 208–233.

Let us turn to West Siberia.

The district of Meninsk began its output as far back as 1829 with slight contributions. From 1876–1880 it yielded annually 51–55 puds; it now produces 36–40 puds.

The imperial washings in the Altai began their activity in 1830; they attained their maximum in 1858 with 57 puds; in 1860 they yielded 33, in 1880, 12, and in 1889 7 puds.

The private washings in the Altai have been at work since 1863. Their largest output of 119 puds falls in the year 1872; in 1880 they gave 84 puds; in 1889, 95 puds.

West Siberia always remained between 6 and 7 per cent of the total output, and never was of great importance.

In East Siberia it was the rich district on the Yenisei, of Nerchinsk, on the Olekma, and on the Amur, that decided the result.

On the Yenisei the exploitation began step by step, yielded but slight contributions in 1840, and from that year rose with extraordinary rapidity. The production was in 1841, 128; in 1842, 365; in 1843, 660; in 1844, 706; in 1845, 759 puds; but soon the highest output was here reached with an average of 1,050 puds for the five years 1846–1850. Thenceforward the figures begin to fall, being—

	Puds.		Puds.
1876	316,	against 1885	223
1877	325,	against 1886	208
1878	340,	against 1887	218
1879	303,	against 1888	217
1880	280,	against 1889	188

In the imperial washings of Nerchinsk the beginning was made in 1836. Only in 1872 was the maximum reached with 153 puds; the output fell just as slowly; in 1880, it was 122 puds, and in 1889, 92 puds.

The private works in Nerchinsk yielded, in 1865, 32 puds; their greatest yield, of 227 puds, falls in the year 1877; in the year 1880 it was 200 puds, and in 1889, 44 puds.

Recent accounts, as yet unconfirmed, state that richer finds have been made on the river Bomm, in the region of Nerchinsk.

In the Olekminsk district but slight amounts were obtained in 1849 and 1850. The figures gradually rose; they were already very high while Yenisei was still yielding over 300 puds, and it was this partially contemporaneous rise that brought about the climax in the Russian production in 1876–1880.

The Olekminsk district yielded—

	Puds.		Puds.
1876	627,	against 1885	171
1877	928,	against 1886	172
1878	851,	against 1887	167
1879	825,	against 1888	225
1880	939,	against 1889	235

Finally on the Amur, in the extreme east, we see figures rising even at the present day; there the maximum has not yet been reached, and there the decline of the other districts is for the present compensated. In 1868 there were obtained on the Amur only 50 puds; in 1870, 136 puds. Thereafter:

	Puds.		Puds.
1876	171,	against 1885	302
1877	172,	against 1886	315
1878	167,	against 1887	355
1879	225,	against 1888	377
1880	235,	against 1889	458

Thus the migration is accomplished. Since Russia began to exert a decided influence on the production of gold, the center of gravity lay first in the Ural, then on the Yenisei, then on the Olekma; at the present day the hopes for a future rise in the output are centered on the Amur. "Should the center of gravity of the East Siberian, and therefore of the total Russian gold production, which now rests on the output of the Olekminsk washings, be transferred to the Amur region," wrote Striedter in 1883, "or should the yield of gold on the tributaries of the Amur and on the coast, which after all is not inconsiderable, not develop into one of marked influence on the course of the total production, then, even in the most favorable case, an increase in the total output, produced by the yield in those eastern regions, can not be of continued duration. The sea is set as a barrier to the further migration of the production of gold. * * *[1]

At the same time mention is made of the possibility of technical improvements and of the resumption of work on poorer sands. Certain it is that the past exploitation of the alluvium in Siberia, despite all efforts of technic engineers, has been attended with great loss; but it is an old experience that technical improvements must be introduced before the rich deposits have been exploited; that they are hardly ever able to resuscitate dead washings, unless it be by hydraulic apparatus, which here, in most cases, is excluded from the very start. In order to form an idea of the difficulties encountered in the colder parts of East Siberia, and of the efforts by which some of the past outputs have been obtained, it may suffice to read Helmhacker's description of the process that was employed first on the Pit, an upper tributary of the Yenisei, and later on the Olekma, in order to run prospecting shafts under the frozen soil in the water-soaked ground.[2] One may read in the various descriptions how, in the severe season the water has to be heated in order to get samples, how the fine gold flakes, owing to their conductivity, become studded with fine needles of ice, and, being kept afloat by these needles, are carried off from the washing trough. One may read the numerous reports of the enormous consumption of wood, the destruction of forests by wild fire, and their devastation by gold digging; and thus one will be enabled to judge how high the gold would have to rise in value to permit the resumption of work on alluvium that has already been despoiled of its richest contents. But this is true not merely of the cold district; the resumption of old washings always requires specially favorable local conditions in order to be remunerative.

In the meantime search has been made for lodes on the Amur, too, but the two reports by Yachefski and Makerof, which I have before me, do not indicate that this region promises results from lode mining markedly superior to those obtained elsewhere. The gold appears for the most part in quartz with iron-bearing copper pyrite, but it does not seem to have continued, at least not in the special cases mentioned.[3]

In 1889 the number of mining tracts newly entered was 762, surveyed 395, grants 378. The production of gold, widely spread, employed over 84,000 workmen. The great number of small working tracts gives rise to those compensations which finally result in a pretty steady course of the total figures. In these total figures the maxima of the various areas, their rise and decline, are effaced, but whoever considers their composition sees the future which is in store for them.

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[1] Ibid., page 232.

[2] R. Helmhacker, Ueber das in Sibirien übliche Abteufen von Schurfschächten im schwimmenden Gebirge; Berg- u. Hüttenmänn. Zeit. v. Kerl u. Wimmer, March 6 and 20, 1891. The rather unsatisfactory conditions of the exploitation at the present day were graphically described by Hammerschmidt, Russ. Revue, 1888, XXVIII, S. 332, etc.

[3] L. A. Yachefski, Short geologic sketch of the production of gold in the Trans-Baikal district at the confluence of the Ingoda and Onon rivers. 8vo. St. Petersburg, 1888, 64 pages; map. J. A. Makerof. Geologic description of the gold-producing localities on the Amur; Izvyestya Imper. Geogr. Soc. East Siberian Branch, 1889, XX, p 34-66, maps (both in Russian).

Take out of any population 1,000 male individuals of different ages. Among them are infants and boys, youths, men, and old men. It will be easy to obtain a numerical estimate of the working capacity of these 1,000 men, say in field labor. After one year, some of the old men will have died, but on the other hand some of the infants will have grown into boys, boys into youths, youths into men. The estimate will show pretty nearly the same working capacity. The same will be the case after the second, third, and fourth year, and for some time to come. But when all the infants have grown into boys, all the boys into youths, and all the youths into men, when all the men have passed into old age and no progeny is supplied, then begins the decline and the end may be foreseen.

Of this nature are the figures of the Russian gold production, which at present still run with some uniformity.

TRANSVAAL.

For some time it had been known that there are gold bearing strata of drift which, for the most part consolidated into a hard cement, are intercalated in the stratified deposits of former periods of the earth's history. The gold was found not in the drift itself, but in the cement of the conglomerates, and these were regarded as gold-bearing alluvium of early times. At Bassèges in southern France it is said that at one time there existed mines of gold-bearing conglomerate of the Carboniferous formation. At Temora and Gulgong in New South Wales, on the Peak Downs in Queensland, and at several points in Tasmania and New Zealand, such conglomerates were mentioned, but they do not seem to have been successfully worked anywhere.[1]

More important and especially instructive are the similar occurrences in the vicinity of Homestake Vein in the Black Hills, Dakota, described by Devereux.[2]

Homestake Vein is a vast gold-bearing quartz vein, rising in old schist mountains. Its outcrop, in large part overlain by a sheet of porphyry, is known for a distance of about 1.5 kilometers, with a breadth of the ore-bearing rock of 100 to 200 feet. East of the outcrop of this vein begins the gold-bearing conglomerate, with gentle slope. It consists of rounded masses of quartz, and, significantly enough, of frequent drift of hematite, which we have just mentioned in the gossan of Mount Morgan. The gold in it is designated as "cement gold." The richest deposits were found always in the lowest part, close to the underlying bed rock, and especially in small depressions and furrows of the latter, just as is wont to be the case with alluvial gold. Nevertheless, this deposit is not the formation of a river, but, as shown by the accompanying remains of marine animals, it is the beach of a sea of primitive, Cambrian time. At that time already the gossan of Homestake Vein was destroyed by the breakers.

As a rule only 5 to 6 feet above the bed rock paid for stamping. The gold, quite as in the present alluvial land, appeared in the form of gold dust or in slightly flattened grains. The hematite drift as a rule showed adhering gold. The gold was always arranged in strings in such manner that manifestly the specific gravity determined the arrangement. The cement gold carried less silver than the Homestake lode. The separate grains were as a rule coated with a film of brown iron oxide. It seems, however, that here also partial solution of the gold took place in the long course of time, for in the floor, consisting of schistose primitive rock, as well as on pieces of schist in the conglomerate, there occur thin flakes of gold, which can only have been precipitated in fissures from solution.

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[1] R. Daintree, Note on certain modes of occurrence of gold in Australia; Quart. Jour. Geol. Soc., 1878, XXXIV, p. 435.

[2] Walter B. Devereux. The occurrence of gold in the Potsdam formation, Black Hills, Dakota; Trans. Am. Inst. Min. Eng., 1882.

The extended stratum of conglomerate with cement gold has in recent time been furrowed by water courses, in which, at the expense of the conglomerate, rich young alluvium has been formed, notably in Deadwood Gulch.

At this point, therefore, there were to be distinguished three sites of deposition and a double restratification, namely, (1) Homestake lode, (2) its gossan, abraded by the breakers of the Cambrian sea and now forming the cement gold, and (3) the young alluvium, containing the washed-over cement gold.

The cement gold of the Black Hills, by the way, was already exhausted in 1882.

After mentioning these experiences gathered in other lands, let us turn to the South African occurrences.

Journeying from the east coast toward the Transvaal, one crosses first a plain, then, after a steep climb, a mountainous region of considerable extent, stretching from Crocodile River toward Swasi Land, and finally the steep edge of the treeless plateau, 6,000 feet high, the High Veldt. This mountainous middle zone consists of greatly decomposed granite, in which a large mass of old schist is wedged in. This old schist contains bedded veins of gold-bearing quartz; these are the De Kaap gold fields in the vicinity of the town of Barberton. In their main features they resemble so greatly the widespread occurrences in quartz veins that I will not enter into further details.[1]

Entirely different are the gold-bearing deposits at the Witwatersrand near Johannesburg.[2]

If, journeying westward from Barberton, one has crossed the High Veldt, he will, on approaching Johannesburg, come upon granite, and lying against this granite he will find on an east-west line, a series of sandstone and conglomerate in alternating strata; this series is inclined southward. The dip is now very gentle, now almost vertical, as if the whole series would fall away from the granite in a fold. This series is gold bearing. The gold-bearing strata of sandstone or conglomerate are here called "reefs." In the vicinity of Johannesburg there are distinguished going from the south northward, first a south reef, very rich, 6 inches to 3 feet thick: next a less steady middle reef, from a few inches to 2 feet in thickness; then 20 to 150 feet northward of the south reef, a slight but very constant deposit called main reef leader, which thus far has yielded the greatest output; still farther toward the north, but very close, follows the large but less rich main reef, which swells into a conglomerate bank of 40 feet; and 200 to 300 feet beyond the main reef lies the north reef, 1.5 feet thick.[1]

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[1] W. H. Penning, A sketch of the gold fields of Lejdenburg and De Kaap, in the Transvaal, S. Africa; Quart. Jour. Geol. Soc., 1885, XLI, p. 569–590; B. Knochenhauer: Die Goldfelder in Transvaal, mit besond. Berücks. der de Kaap-Goldfelder, 8vo, Berlin, 1890; W. R. Furlonge, Notes on the geology of the De Kaap goldfields in the Transvaal; Trans. Am. Inst. Min. Eng., 1890, XVIII, p. 344–348, map. In this region lies also the oft-mentioned Sheba mine.

[2] The rapid increase of gold production at Witwatersrand has called forth a flood of writings which do not invariably betray the same degree of freedom from bias; this unfortunately is the case also with some of those writings whose authors call themselves specialists, or wish in some way to be recognized as such. My discussion of this region rests mainly on E. Cohen: Goldführende Conglomerate in Südafrika, Mittheil. d. naturwiss. Vereins f. Neuvorpommern u. Rügen, 1887; A. Schenck: Ueb. das Vorkommen des Goldes in Transvaal, Zeitschr. deutsch. geol. Gesellsch., 1889, S. 573–581; A. R. Sawyer, The Witwatersrand goldfield; Transact. N. Staffordshire Inst. of Min. and Mach. Eng., Newcastle-under-Lyme, 1890, X; also upon some separate notices in South African Mining Journal, edited by E. P. Rathbone, in Johannesburg; for the figures, on the statements of this journal, as well as on the reports of the Witwatersrand Chamber of Mines. General descriptions of the geologic relations are given in Ch. J. Alford, Geol. Features of the Transvaal, 8vo, London, 1891, maps; W. H. Penning, A contribution to the Geology of the South Transvaal; Quart. Journ. Geol. Soc., 1891, XLVII, p, 451–463, map, and elsewhere. Social conditions are discussed in C. Weinstein, Von Südafrika und seinen Goldfeldern, 8vo, Berlin, 1890. Furthermore I am indebted to Dr. A. A. Schenck, in Halle, and to Mr. A. Epler, in Johannesburg, for their kindness in furnishing information.

Thus it is at Johannesburg, but the various beds and reefs, as is the rule in similar formations, have more or less the shape of very flat and extended lenses; that is to say, they wedge out, other lenses take their places, and this is the reason of the greater or less constancy of the various reefs.

The distance over which the reefs are known on the line of Johannesburg is probably 80 kilometers, but the limits of profitable working are not known either to the west or to the east. Toward the east, across Boksburg, there occur disturbances of the stratification, which render the tracing of the strata difficult; but yet the strike there seems to turn southward, as if a great trough was to be inclosed. Some traces are said to have been found even east of Heidelberg, far to the south of Vaal River. West of Johannesburg the marks of the various strata are lost more and more; but yet sandstones and conglomerates are said to continue far beyond Potschefstrom, even as far as Klerksdorp, probably 150 kilometers.

The best authorities on the country have accepted the view that the wealth in gold of the conglomerate reefs or "bankets" at the Witwatersrand has resulted from the destruction of gold-bearing lodes, like those that are worked at the present day in the De Kaap field. This, in fact, would agree perfectly with the experiences from the Black Hills, Dakota. But there enters a circumstance which is not known elsewhere in auriferous conglomerates, and which exerts a decisive influence on the exploitation.

The conglomerates, as a rule, consist of quartz drift, hardly larger than a fist, or, as Cohen thinks, of quartz gravel, united by a hard, sandy cement. The occurrence of gold in the drift itself is not proved with certainty; it belongs to the cement. Where it appears as free gold it has the form of fine flakes and scales or the crystalline form of a cube. Thus it appears especially in the "red banket," which, by its hydroxide of iron, is colored red to dark brown. Now this red banket in all the pits at a certain depth passes rather suddenly over into the gray-green banket, which contains the gold in pyrite; in other words, the conglomerate beds of the Witwatersrand present altogether the same change in the ore as lodes. The red banket is the gossan, as is very properly pointed out by Sawyer; the gray-green, occasionally blue, banket corresponds to the zone of the sulphides. The line of division is sharply marked; it often is found already at the surface, often only at a depth of 200 feet.

Such being the state of affairs, and no gold dust proper or wash gold being demonstrable with certainty in the bankets, the question raised by Sawyer is indeed very pertinent: whether the gold of these conglomerates is really wash gold or whether it did not get into the cement of the bankets independently with the pyrite as a solution or exhalation from the depths. Of those conglomerates, which occur occasionally at De Kaap, Furlonge says distinctly that the gold made its way into those layers only later.[2] All samples from the red banket of Witwatersrand that I have held in my own hand showed gold in fine scales adhering to the surface of the brown quartz drift, or interspersed in the brown cement in a way similar to that which is wont to occur in the decomposition of the pyrite in the gossan of quartz veins. If the assumption is to be maintained that it is alluvial gold, then it would follow that it had subsequently been inclosed in pyrite, which does not correspond with experience elsewhere.

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[1] Alford, loc. cit. p. 19.

[2] Furlonge, loc. cit., p. 345.

Whether this question be solved in one way or in another this much is certain that this method of mining, as it goes downward, encounters the same difficulties as mining in lodes. Here, too, we find the refractory sulphides which hamper operations and necessitate extensive working apparatus. In this respect, despite extrinsic difficulties, arising from lack of a railroad, from unwise taxation, etc., in Johannesburg very creditable results seem to have been achieved. Chlorination and cyanide works after the best models are already in existence, and professional papers even maintain that in the way of chlorination as much as 97 per cent of the gold contained in the sulphides is obtained. The sulphides, however, are much poorer in gold than the gossan, and the result is *that annually the whole output indeed rises, but in proportion as the drifts pass through the gossan, the fertility of the ore, that is to say, the yield per ton extracted, declines.*

The output was:[1]

	Total gold.		Per ton.
	Oz.	*Dwts.*	*Dwts.*
1887 (8 months)	23,155	8	
1888	208,121	14	22.65
1889	369,557	5	19.60
1890	494.817	½	13.64
1891	729,238	6½	11.23

The data of the richness of the ore for 1888 relate to the last four months of the year; at present it is about one-half of what it was then. Hence it is manifest that the statement that at Witwatersrand the richness increases with the depth, is in contradiction with the facts. From this it does not follow that the mining will speedily cease, for many poor works in the sulphides are in operation. It follows, however, that every technical improvement will have to be carefully employed, and that the profit will diminish. It is thought that here with a content of 7 to 8 dwts. the expense will be covered, because the Kaffers furnish cheap labor. In the East Indies, where labor is also cheap, 10 dwts. are allowed for cost.[2]

The value of gold of £3 10*s.* per ounce gives for 1891 at Witwatersrand the respectable figure of £2,552,333.

The efforts that have been made in the course of the past year to run the railroad not only to Johannesburg but also far north and to open up the north, have naturally awakened hopes of gold finds in the north. The most exhaustive report in existence concerning these regions relates to the Tati Mining Concession, situated at the southwest end of a series of gold-bearing formations, which are said to extend irregularly through Matabele Land, Mashona Land, and Manica. This report, which, as the South African Mining Journal justly observes, is more stimulating than convincing, tells that there is question of gold-bearing lodes occurring in old schist at the contact with eruptive outbreaks of greenstone. This reminds one much more of Queensland or certain New Zealand occurrences, and is entirely different from Witwatersrand. It is a very striking fact that in these remote regions the gold-bearing lodes that have thus far been found have all been worked in former time either by natives or by white men, to a depth of 80 feet and even more. The natives are to some extent familiar with mining, and extract and work copper ores at this day. This fact dampens hope somewhat, for it shows that the gossan has been partly or entirely removed; the sulphides will be found, and one can hardly count upon finding rich alluvial land in such regions.[1]

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[1] The South African Mining Journal, January 16, 1892, p. 273.

[2] The Economist, June 20, 1891.

For the rest, further developments must be awaited in this region.

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[1] S. Afr. Min. Jour., March 19, 1892, p. 446 and 454; for earlier attempts in Tati, see Zukunft des Goldes, p. 315.

CHAPTER III.

RECENT EXPERIENCES CONCERNING THE EXTRACTION OF SILVER.

SULPHIDES AND GOSSAN—VICTORY OF THE FURNACE OVER THE AMALGAMATING MILL—WHITE LEAD ORES OF LEADVILLE—MEXICO—POTOSI—BROKEN HILL.

Gold, as we have seen, presents three modes of occurrence, the sulphides in the depths, the gossan, and the alluvium; to these are added the conglomerates of earlier time. Silver permits merely the distinction of the zone of sulphides and the zone of the gossan. Rich alluvium is not afforded by silver, and hence the production of silver is free from those sudden and transient expansions exhibited by the figures of the gold production in the early times of the exploitation of the Californian and Australian alluvium.

Only in the gossan, and in inconsiderable quantities, does silver occur native; its mineral combinations are of very many kinds, and from this circumstance, as we shall presently see, there result altogether unexpected phenomena in metallurgic methods.

In the deeper parts silver occurs at times as silver sulphide (argentite), more frequently in combination with sulphur and arsenic, or with sulphur and antimony, and thus forms the light and dark arsenic-sulphide of silver, polybasite, stefanite, freieslebenite, and other noble ores. At times there is also found argentiferous copper sulphide (argentiferous copper pyrite). But the most important silver ore is argentiferous lead sulphide (galena), which is wont to accompany, in greater or less quantity, the above-named sulphur, antimony, and arsenic compounds, but forms also considerable and rich beds by itself. A frequent companion of silver ores is gold, a less welcome one zinc blende, and some instances are known in which great lodes of silver ores, at greater depth, with gradual increase of zinc blende, were transformed into zinc lodes.

The gangue accompanying silver ores is very often calcspar or baryta, at times quartz, while gold appears always accompanied by quartz.

The silver lodes are often connected with older or younger volcanic rock species; especially are such ores frequently found at the contact of volcanic rocks with limestone, and this contact may have been brought about either by rising dikes or by laterally entering stratiform veins, in which latter case the ore assumes more the form of an extensive stratum than of a vein, although it also lies at the contact with an intrusion. True, among the galena occurrences there are some that seem to have been deposited from solutions in former cavities of the rock.

Quite different from the zone of the depths is the condition of the gossan of silver ores. It consists for the most part of very rich black or black-gray compounds of silver with chlorine, bromine or iodine, and small quantities of native silver; at the outcrop of galena beds there appears at times in considerable quantities white lead ore (cerussite, carbonate of the American miners). The Spaniards call the projecting black crests of the silver lodes *crestones*. The richest silver vein worked at this day, Broken Hill, in the Barrier ranges of South Australia, has received its name from the fact that it rises in the form of such a dark, jagged creston, like a broken hill, from the desert.

The ores of the crestones, that is to say, of the gossan, like the gossan of the gold lodes, submit much more readily to refining processes than the sulphides of the depth. Often they may be directly subjected to amalgamation, while the ores of the depths need first roasting with chlorine. For this reason, on the silver lodes too, the first results are the greatest. In Chile the ores of the gossan are called metales calidos (hot metals), those of the depth metales frios (cold metals),[1] and the working of the latter presents greater difficulty.

These latter, the ores of the zone of the sulphides, the metales frios, rothgiltigerz, polybasite, silver glance and others, are the ones which in North America have received the name "dry ores." In Germany they have for a long time been called Dürrerze (dry ores). In former years in the United States they were merely roasted and amalgamated, with the addition of salt, copper vitriol, and in various other ways. In the course of time, however, the great advantages of the furnaces, which had long been in use in Europe, were recognized, as contrasted with the amalgamating mills, and especially in the State of Colorado there was developed in the course of the past few years a great furnace industry, depending on the smelting of dry ores with the addition of plumbiferous silver ores.

The consequence was a thorough transformation and a considerable rise in the American silver production. On the one hand the furnace industry was rendered independent of the decreasing quicksilver production of California, and on the other hand there ensued an extraordinary increase in the value of those argentiferous lead ores that were serviceable as fluxes, especially the white-lead ore in the gossan of the mining district of Leadville, Colo. Soon it appeared that the profit arising from the smelting of the dry ores with white-lead ore, as compared with the old amalgamating process, was as great as, or greater than, the loss through the decline of the price of silver, and on this fact depends in no small degree the recent boom in the silver production of the United States. To this was added the rise in the exploitation of the argentiferous copper pyrites of Montana caused by the Paris copper ring, and many other circumstances, so that despite the decline in the silver production of the great Comstock lode in Nevada, the annual output of silver of the United States shows steadily rising figures.

But in order to be able to follow the course of affairs, I must say a few words about the deposit of Leadville.

The town of Leadville, in the State of Colorado, is built in the valley of the Arkansas River, on the west side of the Mosquito Range, a spur of the Rocky Mountains, on a moraine, more than 10,000 feet above sea level, and has shown a growth extraordinary even for American conditions. Toward the end of 1877, it numbered about 200 inhabitants; in two years their number reached 15,000. In 1880 the town possessed already gas works and waterworks, 13 schools with 1,100 children, 5 churches, 3 hospitals, and 14 smelting works with 37 steam chimneys.

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[1] W. Möricke, Einige Beobachtungen über chilenische Erzlagerstätten und ihre Beziehungen zu Eruptivgesteinen; Tschermak, Min. u. petrogr. Mittheil., Wien, 1891, S. 186–198; examples in Zukunft des Goldes, p. 107.

We possess a model monograph of the ore deposit of Leadville by Emmons, and a very detailed presentation of that important part of the deposit which is called Iron Hill, by Blow.[1] The last mining disclosures used by Blow showed the following mode of appearance of the ores:

A stratum, about 200 feet thick, of stratified limestone, is covered by a still far heavier mass of white porphyry. Under the limestone, in part following the surfaces of the strata, a vast bedded vein of an eruptive rock has entered later on, which is called the gray porphyry, and which sends upward in many directions intrusive veins into the limestone. The ores, according to Blow, are manifestly connected with these intrusive veins, and in various parts of the limestone appear in chimneys or so-called "chutes"; besides this, however, the ores are found at the upper boundary of the limestone toward the overlying white porphyry in the shape of flat, extended bodies, which in shape resemble entirely the fillings of shallow basins.

The entire thickness of the limestone, and especially its uppermost part, therefore, are ore-bearing. At the same time, however, all parts of the mountain, the limestone, the porphyries, as well as the older substratum, are cut through by six great faults, running from north to south, and along which the whole rock system has dropped down irregularly in steps toward the west. This irregular downthrow causes the ore-bearing parts of the limestone to appear at the heads of the different steps at different points and at different heights.

At the foot of the most westerly step-fault lies the town of Leadville. Beyond this fault the downthrow of the rock is so considerable that it remains entirely buried beneath the alluvium of a lake of the glacial period.

The ores are changed from the surface downward, and so far as the change, that is to say, the gossan, extends, they consist, besides decomposed iron pyrites and manganese, of white-lead ore, accompanied by larger or smaller bodies of chloride, bromide, and iodide of silver. In the depth, at Iron Hill quite suddenly, at a distance of a few feet, this decomposition comes to an end and the zone of the sulphides is reached, consisting of galena, accompanied by iron pyrites and zinc blende.

Quite similar are also the occurrences of Aspen Mountain, situated about 80 kilometers from Leadville, beyond the Sawatch Mountains.[2]

Now, it was the white-lead ores of the gossan of Leadville and Aspen that, on account of their applicability as flux, gave the main impulse to the transformation of the furnace process for the extraction of silver from the dry ores. The significance of this revolution is most distinctly set forth in the presidential address by Richard Pearce before the Society of American Mining Engineers in June, 1889.[3] A table presented on that occasion shows that in Colorado in 1871 the metallurgist returned to the miner out of 100 ounces of silver contained in a silver ore of average quality 65 per cent, so that 35 per cent were reckoned as loss and as cost of extraction. The former number fell in 1874 from 65 to 53.6 per cent; from that time, with continual improvements in metallurgy, it rose steadily, until in 1889 already 84 per cent could be returned. Thus the loss to the miner had fallen since 1871 from 35 per cent to 16 per cent; in other words, his profit had risen 19 per cent, or, as compared with 1874, even 30.4 per cent, and in this way, as well as through improvement in freighting, machinery, and in other ways, the loss due to the fall in the price of silver was entirely balanced.

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[1] S. F. Emmons. Geol. and Min. Industry of Leadville, Colo.; U. S. Geol. Survey, Monogr. XII, 1886. 4to, Atlas; A. A. Blow, The Geol. and Ore Deposits of Iron Hill, Leadville. Colo.; Trans. Am. Inst. Min. Eng., 1890, XVIII, p. 145-181, map. The limestone belongs to the carboniferous formation.

[2] C. Henrich, Notes on the geol. and some of the mines of Aspen Mountain, Pitkin County, Colo.; Trans. Am. Inst. Min. Eng. 1889, XVII, pp. 156-206. Here, too, the ores are found in the lower carboniferous limestone in proximity to intrusive porphyry.

[3] Richard Pearce, Progress of Metallurgical Science in the West, Presidential Address; Trans. Am. Inst. Min. Eng., 1890, XVIII, p. 55-72; for the details of the operations see D. E. Peters, Der Flammofen-Betrieb zu Argo in Colorado; Berg-und Hüttenmänn. Zeit. v. Kerl und Wimmer, 30 January 1891, S. 46.

Very justly Pearce might add: "It will be seen from these figures that if it were not for the great efforts which have been made from time to time to cheapen the cost of smelting, silver mining here would have received its deathblow long ere this. The decline in the price of silver has brought the net value of the ore to the miner down to about the same as it was thirteen years ago, but the cost of mining has been largely reduced by improved facilities for transportation, by cheaper labor, and by cheaper materials, enabling him to sell at a profit ores that formerly were worthless. These same elements have, of course, helped the smelter to a still higher degree, and there is yet room for further improvement."

Thus it was in 1889; but during this boom and during the great increase in value of the lead carbonate ore a greater and greater number of mines in Leadville passed from the gossan into the sulphides and lead carbonate ore became rarer. Even in 1888 there had been brought from Mexico, across El Paso alone, 70,922 tons of argentiferous lead ore as flux, which gave 20,973 tons of lead. The owners of lead ores, that is to say of fluxes, in Colorado and Idaho objected to this importation of flux ores from Mexico and appealed to the tariff, according to which silver ores, indeed, were free, but lead ores were subjected to a duty of 1½ cents for the pound of lead. That would have been a prohibition for the fluxes. To the silver mines that produced dry ores, as well as for the great furnace works, the continuance of the introduction ot lead fluxes from Mexico had become a vital question. Thus a lively struggle broke out among the silver producers. The Government adhered to the wording of the tariff. By adding argentiferous ores an attempt was made to raise the silver content of the Mexican importations artificially in order to get them in free of duty as silver ores. In July, 1889, the Government issued instructions to the customs officers according to which it was to be decided, whether silver ores or lead ores were on hand; but this merely led to new contests. In August the Mexican importation of flux ores had already sunk one-half, and the furnace works ordered a considerable advance in the cost of smelting the dry ores. In the meantime the lead ores within the United States constantly rose in value, and for Leadville alone the value of the production for 1889 was estimated at $18,000,000.

In the midst of this strife arose the agitation for the free coinage of silver in the United States, which by the way bore from the very beginning in no slight degree agrarian characters. An appeal invited attendance at a conference in St. Louis on the 26th of November, "because St. Louis lies in the heart of the agricultural States." I must add that the leading "New York Engineering and Mining Journal," from which many of these data are taken, opposed at the same time in most intelligent manner, in a series of excellent articles, both the prohibition of the Mexican ores and the free coinage of silver.

The conference in St. Louis had little success; the discord among the silver producers increased. The advantages were thought of which the erection of smelting furnaces in Mexico ought to offer, that country being very rich in silver ores of the most diverse kinds. In fact, already in May, 1890, the Mexican Government concluded a contract aiming at the erection of five smelting furnaces in different parts of the country. While in Washington the McKinley bill was being discussed, Mexico built a railway to the lead mines of the Sierra Mojada, and soon the first furnace began operations, in Monterey.

The McKinley bill maintained the high tariff against Mexico, but it enabled the furnaces at least to transform themselves into "bonded warehouses," that is to say, to work up foreign lead ores free of duty for exportation. By the end of 1890 the production of lead from home ores in the United States had diminished by 3,300 tons, in part on account of the progressive exhaustion of the gossan of lead carbonate ore in Leadville.[1]

All the smelting furnaces raised their charges. Whereas, as was stated before, in 1889 as much as 84 per cent of the silver contents of medium ores had been obtained by the furnace, this figure, owing to the competition of the furnaces, had in some cases been raised even to 95 per cent. Now came a setback. Certain dry ores were altogether rejected. The coinage legislation had raised the price of silver artificially; the mining of argentiferous dry ores had thus received additional stimulus; and now it was found impossible to refine these ores with profit.

Finally production rose again; some furnaces began to work under "bond," others resolved to smelt the dry ores with smaller charges of lead; that is to say, with greater loss of silver in the slag. Some of the most famous old mines of Leadville were transformed into stock companies, as a rule a sign of the end of the gossan. Late in the summer of 1891, however, in Leadville, west of the westernmost mine and of the town, below the new lake deposits and the white porphyry, in the lowest downthrown part of the rock system, at a depth of 570 feet, the drill struck new beds of lead carbonate.

That is the state of things at this moment. I thought it necessary to mention all these details, because they not only illustrate the great revolution in the silver production and its peculiarities, but also give an example of the injurious effect of unreflecting interference on the part of the legislator with the natural conditions of industrial work.

The reciprocal effects on Mexico have already been indicated. That land possesses both very rich lodes of lead flux ores and very rich dry ores. Mexico has contributed more than any country to the silver stock of the world, but its mines, according to the quality of their ores, have been influenced in entirely different ways by the legislation of the United States. Furthermore, in recent time, owing to the Baring crisis, there has been, in many cases, a lack of money.

In Sonora, Sinaloa, and a part of Jalisco, say the more recent reports, the ores are too rich to be affected by the McKinley bill. These go in large quantities to Germany. In Chihuahua and Durango a decline was expected, owing to the relations to the United States and to local causes. In Coahuila the completion of the railway has rendered it possible, despite the tariff, to freight considerable quantities of lead ores from the Sierra Mojada to the United States, while in the district of Mula the ores, with this tariff, no longer pay for shipment, and these go to the newly erected furnaces in Monterey. Nuevo Leon and Tamaulipas yield poor ores, and may also send to Monterey. Zacatecas is declining, owing, it would seem, to insufficient plant in the famous old works,

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[1] Within this time fall the warnings that passed from American into European professional papers against buying certain mines in Leadville that had been famous, but were probably exploited down to the vicinity of the sulphides (Maid of Erin Silver Mines Company, Limited, Economist, June 20, 1891, p. 793, and elsewhere).

The rich district of Catorce produces dry ores, which are not affected by the McKinley bill. In San Luis Potosi a new smelting furnace is in course of erection for these ores. Matehuala furnishes a good basic flux to Monterey. Guanajuato is declining. Pachuca, at present the best district of Mexico, is well equipped, and thus is not exposed to the vicissitudes of other old mines, and steadily furnishes large quantities of rich ores.[1]

Thus Mexico appears as an inexhaustible source of silver, as it has been for centuries, and the variety of its ores promotes the erection of other smelting works in the land in place of the present exportation into foreign countries, which for the present is still on the increase.

All the conditions of silver production have been transformed by the victory of the furnace method and by the greater facility in shipment of crude ores. As examples for the mode of occurrence of the ores I select two other points, Potosi, in South America, and Broken Hill, in Australia.

Potosi.—The old, famous silver lodes of Bolivia, especially the districts of Huanchaca, Colquechaca, Oruro, and Potosi, all lie 14,000 to 15,000 feet or more above the sea. They are all intimately connected with young volcanic rocks. Their great elevation renders work difficult; owing to that circumstance they all suffer from lack of fuel. Up to the present day the process here is everywhere that of amalgamation, with the addition of salt, and, it would seem, everywhere in cast copper vats. A peculiarity of the Bolivian silver ores consists in the frequent presence of tin, and in recent time the separate extraction of tin has been taken in hand.

Among these rich districts I will mention merely that of Potosi. The geological survey of it by A. F. Wendt has given us a more exact picture of the actual conditions, and this, in the main, I will follow.[2]

The Cerro Rico de Potosi is a conical mountain of rhyolite (nevadite). It rises 16,000 feet above the sea, and the old mines extend all the way to its summit. It belongs to the east side of the volcanic line of the Andes, and its waters flow into the La Plata River. Volcanic rhyolite traverses a schist rock, and rests on it in the shape of a cone. At the foot of the cone there are Tertiary strata containing leaves.

The lodes all belong to the mass of the rhyolite and to the next adjoining parts of the schist rock, but the richest all lie in the rhyolite. In a general way they form together a chain of lodes running approximately north northeast to south southwest. The several main lodes seem to be somewhat alternating, and have a tendency to branch out upward, like those of Kremnitz, with which Wendt compares them, with perfect propriety, so far as I can see. My view is that such lodes are to be regarded as fillings of fissures, not of dislocation but of contraction, produced immediately upon the cooling of the eruptive stock and its surroundings, and which in the last phase of the volcanic phenomenon received the metals as an emanation from the depths, mostly in the form of sulphides. The origin by contraction is evinced both by the alternation and by the branching. Gmehling's description of the

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[1] Report in Eng. and Min. Jour., New York, Jan. 9, 1892, p. 87.

[2] Arthur F. Wendt, The Potosi, Bolivia, silver district; Trans. Am. Inst. Min. Eng., 1891, XIX, pp. 74–107. Map. Consul Ochsenius, in Marburg, in a recent letter expressed to me doubts whether the silver lodes really enter into the Tertiary strata which contain plant leaves, and hence I have not touched this question. But the lodes are younger than the rhyolite of the cerro, and since the latter rests upon the plant-leaf-bearing strata I infer from this the recent age of the lodes, which in this respect, too, seem to be comparable to those of the Carpathians.

Pulacayo mine, in Huanchaca, indicates that the same conjecture applies to that mine.[1]

This branching upward creates at the Cerro Rico de Potosi a tangled network of ore lodes in the gossan. The gossan, as usual, consisted of silver chloride and native silver. These ores were called pacos. The filling of the lodes farther down is of dark color and very hard. These are the negrillos. They consist of dense iron sulphide, with some copper sulphide, at times zinc blende and very little galena. The silver, according to Wendt, occurs in them in the shape of fahl ore. Helms enumerated a greater variety of silver ores.

The gossan of these lodes was broached toward the close of the first half of the sixteenth century, and the output, of which the fifth part was delivered to the Spanish court, was an extraordinary one. Humboldt stated it to have been for 1554–1556, every year, 7,500,000 thalers; 1556–1578, 445,000 thalers, and 1579–1736, 4,100,090 thalers. The statements of the Spanish officials are much higher. Juan Diaz de Lupidana, charged with the auditing of the royal accounts, found for 1541–1591 an annual yield of 39,600,000, and in this space of time 360,000,000 thalers are said to have flowed into the royal treasury. Pedro de Lodano, who, in 1603, under royal command, audited the accounts of the treasury, states the annual yield for 1545–1603 at 51,000,000, the tax obtained only at 59,600,000 thalers. Humboldt, whose figures are so markedly lower, obtains for 1545–1789 the total yield of 812,375,000 thalers. Even these small figures indicate that from the gossan of Potosi alone the Spanish court received toward the end of the reign of Emperor Charles V and in the first years of that of Philip II an annual income of 1,500,000 thalers; and no one can doubt that, with the scarcity of money at that time, these chlorides exercised no slight influence on the course of affairs in Europe.

But even in former centuries the miners knew how to treat the sulphides. The old works have been driven to a depth of 1,700 feet below the surface, and in order to drain them no other means was found than the bags which were carried to the surface on the backs of slaves. Finally, however, the deeper portions were flooded. Toward 1759, when a survey had been carried out, the construction of a draining tunnel was undertaken.

Nordenflycht, who was manager of the work in 1790, abandoned this work, and at another point followed up the "Real Socavon" or royal tunnel, which penetrates into the mountain from the north and lies 2,250 feet below the summit. Helms, whose report I have mentioned elsewhere,[2] found the mines under water; Wendt recently cleared the real socavon, laid down rails in it, introduced drilling machines driven by compressed air, broached in it the famous old lode Cotamitos, and drained the works belonging to it.

According to these statements a new and vigorous revival of Potosi may well be looked for as soon as better communication shall have been established with the lowland, white labor, at least in part, introduced in place of the cheap but very inferior labor of the native Indians, and the construction of the base tunnel pushed vigorously with the improved means. But then it is possible that the working up of the crude ore will no longer be accomplished in Potosi itself.

Broken Hill, in Australia, is at present the most productive silver mine on the earth. In the fiscal year closing May 31, 1891, this mine yielded 242,577 tons of ore, and these gave 8,790,640 ounces of silver and 38,653 tons of lead, with a total value of £2,111,000.

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[1] Andr. Gmehling, Metallurg. Beiträge aus Bolivia; Oest. Zeitschr. f. Berg- und Hüttenwes. 14 June, 1890, etc.

[2] Zukunft des Goldes, p. 206.

This mine lies in the Barrier Ranges in New South Wales, but is most easily reached from Adelaide, in South Australia. The country is a dreary, treeless desert. According to Rickard's description, it consists for the most part of mica schist, with some gneiss-like rocks and quartzite. Garnet-bearing sandstone is also mentioned. The strike is N. 20–30° E., and the dip is westward. The lode follows the strike, but seems to form an acute angle with the dip; it branches out toward the north and south in a manner quite similar to that of the Comstock lode.[1]

The second level, 215 feet below the surface, is 3,960 feet long, and extends throughout the length of the main body; the third level runs at depths between 260 and 380 feet. The second level belongs in the main still to the gossan. A peculiar phenomenon are stretches or layers of kaolin, which are rich in chloride of silver but poor in lead. Cerussite indeed makes its appearance, but not in such quantities as at Leadville. The lower boundary of the decomposed ores is very irregular and ill-defined, and in the second level also there are already found quantities of galena, which are poor in silver and rich in blende. In the third level the ore is essentially changed; kaolin ores are still present at a few places, it is true, but the greater part of the ores consists of rather poor, refractory sulphides. Thus Rickard mentions that toward the south (McGregor's shaft) they contain for the most part only 16 to 18 ounces of silver, 25 to 30 per cent of lead, with much blende and occasionally pyrite. At this lower horizon there exist also considerable inclusions of barren rock. "The day of sulphide ores," says the same authority, "is rapidly coming upon Broken Hill; the magnificent output of the past year has been at the expense of the bodies of oxidized ore already uncovered, and ere long it will have to undergo the experience of Leadville."

The kaolin ores, which are to be regarded as essentially dry ores, were thus far utilized by skilful combination with the cerussite and the decomposed lead ores, but the poorer sulphides render a complete transformation of the furnace methods necessary.

In April, 1891, 5 tons of crude ore from the Australian Broken Hill Consols Company are said to have arrived in London, which contained 8,000 ounces per ton, and on account of this extraordinary richness attracted attention. They were probably washed kaolin ores from the gossan.[2]

In a general way I can not affirm that the reports from Broken Hill at my disposal inspire me with as great confidence of great outputs in the remote future as is the case with the old famous lodes of Mexico or Bolivia. The scantiness of galena in the third level, the barren wedges, and the zinc blende are not favorable indications, although the poorer ores may remain remunerative for a long time to come.

After all it seems to become more and more apparent that the center of gravity of the future silver production will lie in those lodes of dry ore that occur in connection with volcanic rocks, as in Mexico, Bolivia, Peru, and Chile.

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[1] T. A. Rickard, The Broken Hill Mines, New South Wales; Eng. Min. Jour., New York, November 7, 1891, p. 530. According to the last reports there were produced in the calendar year 1891 9,599,932 ounces of silver from 253,681 tons of ore, against 7,785,000 ounces in 1890. Zinc blende increases; the gossan has been pierced.

[2] The Economist, April 18, 1891, p. 496.

CHAPTER IV.

THE COMSTOCK LODE.

ELIOT LORD'S MONOGRAPH—FIRST ATTEMPTS—HENRY COMSTOCK—ROB-MINING—W. SUTRO'S DRAINAGE TUNNEL—W. SHARON AND THE BANK OF CALIFORNIA—WAGE TROUBLES—COMPLETION OF THE BASE TUNNEL—BIG BONANZA—THE HEAT—BALANCE OF 1880—THE END.

The dead figures of statistical tables do not speak of the vicissitudes under which the exploitation of great treasures is often accomplished, and yet every estimate is one-sided if it does not take these vicissitudes into account. As an example we will select the Comstock lode in Nevada. This lode was the greatest accumulation of precious metal that man ever laid hand on. Gold and silver were found united. Hundreds of millions of dollars, not quite half of it in gold, were poured hence into human commerce, and here one may learn how through the great richness of the ores, and the consequent inflaming of the passions, a great lode mine may become as short-lived as the treasures of the alluvial land.

The history of this mine, its noonday, and the beginning of its decline down to 1883, has been furnished in detail and in graphic manner by Eliot Lord.[1] Later articles, especially the American professional papers, enable one to trace the gradual decline down to the present day. All contrasts of our time, hunger in the gaunt wilderness and the most extravagant luxury, extreme lawlessness and the most intense industry, serious scientific investigation, loyalty unto death, and beside it, rascality, theft, murder, the most unexpected incidents of all kinds are here crowded within the space of thirty years.

In January, 1844, a white man for the first time traverses the cheerless, dreary landscape of Washoe; it is the great pathfinder, Fremont. Treeless, scantily overgrown with scrub, a high, craggy mountain range rises from plains covered with white alkaline patches. A few bands of Indians, of the tribe of the Shoshones, eke out a most precarious existence here and there in the land of hunger. In 1848 the country becomes enlivened; caravans of white men travel from the far East hither in order to cross the snow-clad crest of the Sierra Nevada, and reach the newly discovered gold fields of California. Whole trains of these emigrants succumb to hardship in the desert. Corpses of men and of beasts of burden mark the path. At the same time, bands of quiet Mormons advance, seeking for oases in the wilderness where they may settle. These find a little gold dust in the vicinity of the spot which had so remarkable a future in store for it. Here, at the golden canyon, the washers settle, then leave the place on account of starvation, but return again. Toward the year 1857 the washings have been exploited; two intelligent young men, the brothers Grosh, search for the lode that yielded the washings; they find it, and the cattle-dealer Brown wishes to offer them the means to begin the exploitation. Brown is murdered. Hosea Grosh injures himself with a pick and dies, Allen Grosh crosses the Sierra and succumbs beneath the hardships of the journey. Thus ends the first discovery of the lode.

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[1] Eliot Lord, Comstock Mining and Miners, U. S. Geol. Survey, Monograph IV, 4to, Washington, 1883; also J. D. Whitney, The United States, 8vo, Boston, 1889, p. 319, etc. The situation is discussed in a general way in Zukunft des Goldes, pp. 129-159, after the works of Richthofen, A. King, Hague and Raymond, then in existence.

On February 22, 1858, a miner, J. Finney, from Virginia, reaches the lode; he recognizes its value, writes his name on a strip of paper and hides it in the loose rocks; this is that part of the lode which afterward as the "Virginia Consolidated" claim yielded so great treasures. At another point, on June 8, 1859, Patrick McLaughlin and Peter O'Riley reach the lode. A high-handed and extravagant man, Henry Comstock, now appears upon the scene; he manages to oust the two workmen from the greater part of their share. Much free gold is found in the gossan; the heavy black silver ore is not recognized and is thrown aside. Comstock is now supreme on the lode. "His purse," says a recent writer, "was open to all, though in order to fill that purse, he was ready to wade in blood."[1] The rock becomes harder, the fine gold rarer. Comstock is seized by a new fit of restleness. He sells his share, roams afar once more, and dies by his own hand in misery, but his name remains affixed to the lode.

At about the same time the first specimens of the black silver ores came into expert hands. Some reports mention the metallurgist Moshammer, of San Francisco; others, Melville Atwood, of Grass Valley, as the one that was the first to recognize the value of the samples submitted. The first silver bars were carried through the streets of San Francisco, and a banking house placed them on exhibition in the windows. With this begins the great "boom." Thousands flock from California across the snow mountains into the new "Silverado."

The Indians thus far, despite many an affront, had behaved peaceably toward the people at the mines. Their fish preserves had been despoiled, their pastures cropped, but they had endured it. But when two of their girls had been abused they fell upon the house of the evildoers, killed them, and burned down their house. The miners marched forth for a regular battle with the Indians; but they were completely defeated by them in an open fight at Pyramid Lake, and many miners were killed. General terror seized upon the people; for some time all mining was at a standstill. Finally regular troops marched in, the Indians were beaten and fled. On August 11, 1860, the first furnace was put in operation, and on that day the shrill blast of the steam whistle resounded for the first time in the Washoe desert.

Totally inexperienced in things of this sort, the miners now attempted to give unto themselves a mining law. The right to work was granted for the various stretches of the outcrop, as it appeared at the surface, following the dip of the lode, down to indefinite depth. The book of grants was kept by the blacksmith of the new settlement; it always lay open to the public in the beer hall kept by him, which led to innumerable insertions and falsifications. But even aside from this, the granting of tracts according to the outcrop and following the dip of the lode must become disastrous. For it must be noted that the main lode presents itself at the surface as a very wide cleft, occasionally reaching one thousand feet, into which great rock masses have descended from above, dividing the ore-bearing filling in the form of barren wedges.

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[1] Dan De Quille, Comstock as a Mine Superintendent; Eng. and Min. Jour. New York, Dec. 19, 1891, p. 700

Hence the ore appeared at the surface in repeated zones, and independent grants were not rarely made east and west of such a barren wedge. Further down, however, the ore-bearing bulks unite, and strife was inevitable. It was waged in most bitter earnest. At some shafts intrenchments were thrown up, and warfare was carried on above and under ground. But daily the almost immeasurable wealth of the deposit became more and more evident.

The consequence was reckless rob-mining. Everyone tried to get into the depth quickly. One-third of the ores is said to have been lost at that time in the stamping works. Of the remaining gross output of the years 1860–1865, one-fifth, or nine millions, is said to have been spent in litigation.

In the meantime the great civil war in the East had come to an end, and on the Comstock lode, too, after the exploitation of the rich upper bonanzas and a transient tumble of the shares, a little more tranquillity had descended. Adolph Sutro came forward with the plan of running from the valley of Carson River a drainage tunnel under the shafts, which were all suffering from a strong pressure of water. The tunnel was to be 20,489 feet long, and was to run under the nearest shaft at a depth of 1,663 feet. Through this tunnel Sutro intended not only to drain the mines but also to forward the ore directly to Carson River, which moved the stamping mills. The mine owners pledged themselves to pay Sutro $2 per ton. At his instigation the works were visited for the first time by a specialist, to whom later on a brilliant part was reserved in the scientific world: Ferdinand von Richthofen. In 1866 all circumstances appeared favorable to the realization of Sutro's designs, when a mighty antagonist arose in the Bank of California.

In order to trace the further fortunes of the great mine, it is now necessary to cast a glance at the development of the "mills;" that is to say, those dressing and amalgamating works whose relations to the mines became so fateful later on.

In 1860, as we have said, the first mill had been put in operation. Almarin Paul had at that time erected a large stamping mill with amalgamating works. He worked with success, and in the following year there were already sixty-seven similar works with 1,153 stamps. Under the name of Freiberg process, roasting with chlorine and amalgamation in barrels was attempted; it did not turn out as well as the so-called Washoe process; that is to say, stamping and amalgamating with addition of copper vitriol and ordinary salt. Henry Janin was at that time the scientific authority in this region. Into the midst of this development of metallurgic activity came, in the year 1864, William Sharon, the agent of the Bank of California. The mills, quickly put up, in lively competition, were to no small degree in pecuniary straits. They were in the habit of paying 3–5 per cent a month in interest; Sharon offered money at 2 per cent a month. Soon many of these works were united with him or indebted to him. A part of the dressing works was firmly allied with mines; a much larger part worked the ores of different mines after free agreement with them. Sharon gained influence over such mines and withdrew the ores from the mills that worked free. Out of seventeen of such works he formed, in 1867, the Union Mill and Mining Company. At the same time, however, owing to the competition of the works, the price for the working up of a ton of ore sank from $25 to $22 to $10. Finally, in the summer of 1869, Sharon built a railway from Virginia City, as the new mining town was called, at an elevation of 6,205 feet, with a fall of 1,575 feet, down to the mills on Carson River. In 1870 he was practically master on the Comstock lode.

The instructive description given by Hodges of the development of the amalgamating process on the Comstock easily shows how from this point onward, step by step, the conditions became more favorable for the mills.[1] Thus far only the coarser slick had been forwarded to the amalgamating mills; the finer sandy and muddy parts had been left. In 1867, Janin had perfected his method so much that he was able successfully to enter upon the exploitation of the finer slick. The other works followed suit, and the profit from the finer slicks remained a premium for the mills. Finally the practice was in many cases adopted of making the assayer who received the crude ore for the mill responsible for the correctness of the mean content in noble metal. Of this ascertained content, the mill guaranteed to deliver to the mine owner a certain portion, say 65 to 70 per cent, as profit. Under this arrangement the assayer was always inclined to make his figures too small, in order not to suffer loss through his responsibility, and the consequence was rich profit for the mills. All these circumstances at the same time led to an increase in the product of noble metal, and a diminution of the profit of the mine owners. Their profits, however, in the fortunate sections were still so incredibly great, and familiarity with metallurgical processes was so slight, that such secondary circumstances were overlooked.

Under Sharon's vigorous interference in favor of his bank, the spirit of enterprise rose generally, and the mine laborers profited by that favorable moment, recurring to a former practice, to demand a uniform wage of $4 for each eight-hour shift for every workman in the mine without exception. On August 4, 1867, they extorted this wage and maintained it from that time forward.

But the yield of the mines began to decline somewhat. The quotations of the shares began to fall. The finding of a small ore body in Crown Point Mine had merely a transient effect; in May, 1872, the Comstock values fell within two weeks, at the exchange of San Francisco, by $50,000.000. The struggle with inflowing water became more and more difficult with increasing depth; Ophir mine in January, 1872, had to raise daily 146,000 gallons of water from a depth of 1,255 feet.

Ad. Sutro had never given up his plan. In 1869, with little money, he had dauntlessly broken ground for his great drainage base tunnel. In America, he met everywhere with difficulties. Toward the end of 1871 at last a larger amount came to him from Europe, but the technical difficulties were extraordinary. The water in the auxiliary shafts could not be brought under control; he was confined to one point of attack. The machines were so improved that they pushed forward 300 to 400 feet a month in the volcanic rock. The temperature rose. Finally, after nine years' work, on July 8, 1878, the undaunted man, half naked, trembling with excitement, was enabled, the first, to crawl over into the shaft of Savage Mine, and to shake hands with the miners of the Comstock lode. Thus approximately 1,600 feet of the lode were drained.

In the meantime important events had taken place on the lode itself. Two experienced workmen, John Mackey and J. G. Fair, and two shrewd business men, James Flood and William O'Brien, had purchased the Virginia Consolidated claim of the discouraged owners, and, after spending $200,000 in trial works, had disclosed the richest ore body in the Comstock lode, the "Big Bonanza." The boldest dreams were surpassed. The friable rock, the fear of fire, which now and then visited the vast timber structures of the Comstock lode, finally the greed of the owners, led to rob-mining. From day to day the yield of this great ore body increased. In 1876 it yielded through the shafts of the Virginia Consolidated and the neighboring California mine $30,000,000 in gold and silver, in 1877, $32,600,000, in 1878, only $18,500,000, on the whole far over $100,000,000.

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[1] A. D. Hodges, jr., Amalgamation at the Comstock lode, Nevada: An historical sketch of milling operations at Washoe and an account of the treatment of tailings at the Lyon mill, Dayton; Trans. Am. Inst. Min. Eng. 1891, XIX, p. 195-231. Also, J. E. Gignoux, the manufacture of bluestone at the Lyon mill, Dayton, Nevada, in A. Williams, Min. Resources of the U. S.; U. S. Geol. Survey, 1883, p. 297-305.

This ore body consisted of crumbly, crushed, sugar-like quartz, whose richness was only about $80 per ton, but which yielded so great values in so short time on account of the ease of working. The quartz was moderately sprinkled with argentite (silver sulphide) and gold, and traversed by feeble veins of a black ore, consisting mainly of stephanite (silver, sulphur and antimony).[1]

These great riches were wholly obtained before the completion of Sutro's tunnel. The shafts went down deeper and deeper, and ever greater became the difficulties arising from the increasing heat and the inflow of boiling hot water. Church and Lord have given fascinating descriptions of the achievements of the corps of miners. Four dollars for the day's work remained the motto. Rich mines paid these wages easily: poorer ones had to be abandoned. Less rich ores were passed by. Thus the wages promoted rob-mining. But a vigorous, healthy set of workmen grew up, who felt identified with the work, who invested their savings regularly in share certificates of the Comstock mines, and, with the sanguine temperament of the working class, as a rule lost these savings. It was this working class that pushed forward into the hot depths, and there still higher wages were willingly paid. In the hottest parts of the above-named Virginia Consolidated and California mines there were reckoned, in 1878, per man and per day's work, 95 pounds of ice. In July 1877, in the shaft of the Savage Mine, a spring of 69.4° C. was struck: the mine became filled with almost scalding vapor; the tools could only be held by means of gloves, and rags soaked in ice water were wrapped around the iron drills. "* * * Here the men employed could not leave their work as often as the miners that guided the drills, but were forced to breathe the suffocating vapor till they often staggered forth from the station, half blinded and bent by agonizing cramps. When the pain became so great that the men began to rave or to talk incoherently, their companions would quickly take them up and carry them to the coolest place of the level, where they were subjected to a vigorous rubbing on all parts of the body, but particularly on the pit of the stomach. When the so-called 'stomach-knots' disappeared under the friendly hands, the checked perspiration again began to flow, and the men regained their senses. * * *"[2] In the Crown Point Mine, at a depth of 2,000 feet, the temperature of the water reached 65.5° C.

Many lost their lives, many their reason. The ascent from this heat in winter, which in the great shafts took three minutes, often deprived the workman of consciousness, and many a man dropped out of the hoist into the depths. "Death alone has the power to say to miners: 'Thus far shall ye go and no farther,' for no endurable suffering will bar their progress; nor will the loss of life even make them pause, unless the scourge of heat shall strike them down like a pestilence."[1]

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[1] J. A. Church, The Comstock Lode, its formation and history; Trans. Am. Inst. Min. Eng., 1879, and G. F. Becker, Geol. of the Comstock lode and the Washoe district; Monogr. U. S. Geol. Survey, III, 1882. 4to, and atlas, especially p. 270.

[2] Lord *loc. cit.*, p. 394.

This limit had been reached. In the depths no more great bonanzas were found. The amalgamating process made further progress; at the Lyon Mill was learned the method of removing from the gold and silver bullion the copper which had got into it through the copper vitriol, and a material saving was thereby effected, but the former wealth of ores was wanting.

When in 1880 the two model monographs on the Comstock lode, by Becker and Lord, published by the Geological Survey, were concluded, there was presented a complete picture of the lode, as well as of the work accomplished. It is now known that the floor of the great lode dips regularly downward; it is probably a great surface of dislocation. The roof, on the other hand, is irregular; the great barren wedges have been torn from the roof, and the cavities in which the bonanzas lay were probably produced by movements of the roof. Similarly, the crushing of the quartz is a consequence of later movement. The ore consisted of gold and little iron sulphide, but much silver sulphide, also compounds of silver with sulphur and antimony or sulphur and arsenic. The content in gold was not uniform, but it seems to have remained pretty much between one-third and one-half of the total value of gold and silver. Toward greater depths the contents decreased.

At this time the total length of the galleries and shafts on the Comstock lode, which had been driven in the space of twenty years, was 290 to 300 kilometers. At some points the depth far exceeded 3,000 feet. The temperature of the rock rose on an average 3° F. for every 100 feet, or 1° C. for 18.33 meters.

The mills delivered 80 per cent of the contents. The total output since the beginning of the works amounted in 1880 to $174,000,000 in silver and $132,000,000 in gold, corresponding to the proportion 57:43. The highest yield was obtained in 1876 with $38,000,000; in 1877 it was $37,000,000; in 1878 $20,400,000; 1879 only $7,400,000.

The balance of June 30, 1880, showed that on Comstock lode one hundred and three mining enterprises had been started. Of these, only six had worked with profit. These six enterprises had paid in $18,300,000 and had obtained, over and above this payment, $97,600,000 in interest and profit. On the other hand, ninety-seven enterprises had worked at a loss; their lost payments amounted to $43,400,000. The world's commerce, as has been said, had received up to that time $305,000,000 in precious metals.

The third decade is a time of decline and death struggle. In 1880 the total yield was only $5,100,000; in 1881 $1,000,000; in 1882 $1,700,000; it rose again slowly and in 1887 reached $4,500,000. Toward the end of 1886 all deep mining below the horizon of Sutro's tunnel was abandoned, and the great waterworks were stopped. The dumps were picked over and worked. In the upper horizons an aftermath of poorer ores was gleaned. A great school of mining and of amalgamating processes had grown up; its disciples, rich in experience, are scattering into Mexico, South America, Australia, and everyone of them calls himself, proudly, a "Comstock miner." In the meantime the profits for the shares decreased; all kinds of ugly rumors crop out; at one time it is said that barren rock is brought to the mill on purpose, in the interest of the dressing works, at another time, that a bonanza is kept under water, and that the small stockholders are first to be "frozen out," that the profits may not have to be divided.

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[1] Lord, *ibid.*, p. 396.

The ores became poorer, at least the number of tons extracted rose while the production fell; in 1890 the latter was $4,000,000. Many works published deficits. The tax on the use of the Sutro tunnel was lowered to enable the poorer ores to be extracted. Respectable professional journals spoke openly of theft. Suddenly, in March, 1891, the quotations of the shares began to rise again. "Let no one be deceived. The leopard has not changed its spots, and the 'mill ring' * * * is still the same * * *," wrote the Engineering and Mining Journal.[1] Finally it was stated publicly that on one of the larger works the slimes were not allowed enough time in the mill to be completely amalgamated, and that the still rich slimes passing from the mill were ladled off from the sand tank into a small side mill, in which they were amalgamated to the profit of the mill owners, and that in this way they were stolen from the mine owners.[2] On December 26, 1891, the Engineering and Mining Journal gave the instantaneous photograph of a workman, scoop in hand, about to ladle the slimes off into the side mill, and at present the affair is pending before the criminal court in San Francisco.

Thus ends the richest mine on earth.

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[1] March 21, 1891, p. 346; also April 25, p. 491; May 23, p. 601.

[2] The same, May 23, 1891, pp. 601, 603.

CHAPTER V.

THE SUPPLY OF THE PRECIOUS METALS.

RESULTS OF GOLD PRODUCTION—RESULTS OF SILVER PRODUCTION—CONSUMPTION OF GOLD—THE STOCK OF GOLD.

I.—GOLD PRODUCTION.

The production of gold has been the subject of detailed and most welcome studies by Mr. A. Soetbeer and the American Mint. To the figures I wish to add the following remarks:

(1) *United States.*—No important new deposits were discovered; washings maintain themselves chiefly in California, where the continuance of hydraulic work is checked by legislative enactment. Lode mining has been aided by metallurgic progress. Total of production according to Leech for 1890, 49,421 kilograms; provisional figure for 1891, 50,380 kilograms.

(2) *Australia.*—Decline of production, partly balanced by the yield of Mount Morgan, whose deposits, however, are being exhausted with remarkable rapidity. Output, in 1890, 45,767 kilograms; for 1891 almost exactly the same.

(3) *Russia.*—The yield, almost exclusively from alluvial gold, maintains itself at the same height by displacement of working sites, and has reached the Amur. In recent time finds are said to have been made on Bomn River (Nerchinsk). The figures are diminished somewhat by the conversion of crude gold into fine gold. Total, for 1889, according to Kulibin, 33,130 kilograms; for 1890, provisionally, 31,841 kilograms, according to newspaper reports somewhat higher; for 1891 not yet known.

(4) *South Africa.*—The conglomerate beds of Witwatersrand yield constantly increasing outputs. De Kaap also is rising; for 1890, 14,877 kilograms are to be set down. The figure for 1891 may rise much higher, possibly to 23,600 kilograms.

(5) *China.*—Under this heading there appear in the tables of the American Mint considerable figures since 1883, based, first, on estimates of the gold production on the Chinese Amur by Ivan Michels, and since 1886 on an estimate of the net exportation to India and England, as was expressly stated in the tables in a note. The latter estimate as late as 1887 amounted to \$9,500,000=14,294 kilograms; for 1888 and 1889 \$9,000,000=13,542 kilograms, and for 1890 \$5,330,000=8,020 kilograms.

These amounts were originally regarded as Chinese production, but the reports of Ellis Clark and other travelers contain no data for assuming such a production;[1] it was thought that these amounts represented the reëxportation of alluvial gold that had been brought home by Chinese from Australia and California. To these figures cling all the doubts which under similar circumstances affect the figures of net exportation, and their reliability was seriously called in question.[1] Mr. Soetbeer, too, in his last article, declares this estimate of the Chinese production by the exportation as hazardous and unsafe.[2]

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[1] Ellis Clark, Notes on the progress of Mining in China; Trans. Am. Inst. Min. Eng., 1891, XIX, pp. 571-595. Maps.

But there exist even statements to the contrary. The statistical secretary of the imperial Chinese custom-houses, Mr. E. McKean, has raised the question of the equalization of the deficit of China in payments, and remarks at the same time that in the last three years a gold exportation of £1,318,100 has taken place, with a simultaneous importation of silver of only £139,400. Further on Mr. McKean says:

> Chinese send from abroad gold and silver coins in considerable amounts, which are carried by travelers and in this way do not find their way into the lists of importations. In the years 1887, 1888, and 1889, the known importation of gold into Hongkong was $3,822,700, and the known exportation of it—almost exclusively to London—was $10,593,980, that is to say, a difference of $6,771,280 in three years, a surplus whose existence in Hongkong is explicable only on the supposition that it was brought by Chinese travelers from America and Australia.[3]

According to this the figures hitherto current concerning recent gold production have to undergo a diminution in this item.

According to English papers the declared importation from China, including Hongkong, was in London, $1,300,000 in 1890, and $5,500,000 in 1891; the exportation of gold thither was quite small. What may have been the net exportation to India, I do not know.

If for 1890 we assume the third part of McKean's figures, or $2,260,000, then we have to set down for China 3,400 kilograms. But even this figure is subject to reasonable doubt.

(6) *Colombia, South America.*—T. H. Wheeler reports to the foreign office in London that the trade of Colombia indeed is rising, but that the attainment of reliable figures relating to exportation is beset with insurmountable difficulties. Wheeler says that the figures kept by him are undoubtedly too small, "since no account is taken of the fact that a part of the gold and silver exported was manifested in gold currency and not in Colombian paper money." The decline in the production of gold and silver explains the smallness of the rise of exportation to England. The mining industry, says the report, is almost entirely paralyzed by a law against the pollution of rivers. Abundance of alluvial gold is said to be still present in the central Cordillera.[4]

The total exportation of Colombia in coffee, tobacco, rubber, and other products of the country, including the precious metals, into Great Britain, France, Germany, and the United States was according to the same report in 1889 £1,170,000 and in 1890 £1,350,000. Under these circumstances I must regard as too high those figures which for those two years put the production of gold at $3,430,000 and $3,695,000, and those of silver at $612,000 and $735,000. The very detailed remarks of the United States Mint relating to these figures, however, seem to me to justify these doubts still further. Gold has long since ceased to be coined in Colombia. In 1863 the gold circulation stopped. In 1875 silver too began to leave the country; in 1884 difficulties arose in the circulation: since then the currency consists of paper. Mr. Vincente Restrepo indeed attempted to obtain more definite figures from the records of the custom-houses, and thinks himself able to estimate the exportation in 1890 at $3,600,000 in gold and $830,000 in silver, but adds that only by a veritable "tour de force" might it be possible to obtain correct data; that in statistical data the country was very backward.[1]

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[1] E. Suess, Gold in Südafrika und Australien; "Die Nation," Wochenschrift, herausg. v. Th. Barth, Berlin, 8 August, 1891, S. 690.

[2] Ad. Soetbeer, Litteraturnachweis, S. 284.

[3] The foreign trade of China; Economist, June 13, 1891, p. 6

[4] Economist, January 9, 1892, Supplement, p. 9.

A report of the German consulate, mentioned by Soetbeer, states for 1889 an exportation of 3,761,420 pesos, but, as compared with Restrepo's statements, it would seem probable that 454,300 pesos of ores, herein included, have to be added to the silver; elsewhere too, an item of "gold and silver bars" at 483,032 pesos is included. The former mining commissioner for Tolima, John C. F. Randolph, says:

> A very large annual gold product has always been claimed for the Republic of Colombia, without any authentic figures being given to sustain the claim. It is not impossible that as much as $2,000,000 annually may be produced, mainly coming from the very small enterprises in ground-sluicing thin patches of gravel of slight area. Much territory in Colombia still remains to be explored, undoubtedly, and valuable mines may be actually discovered.[2]

According to this I set down the output of Colombia at $2,000,000=3,009 kilograms.

(7) *East Indies.*—Only a few lode mines are in operation. Those that aroused the highest hopes did not pay, but on the other hand Mysore yields sufficient amounts. The figure, for 1890 is 2970 kilograms, slightly differing from Mr. Leech's estimate.

If to these figures there be added, as has been done by Mr. Leech, 16,061 kilograms for the smaller producers, there results a total output of the earth in gold in 1890 of 167,346 kilograms, very close to the average figure, often stated by Mr. Soetbeer for previous years, of about 160,000 kilograms. Mr. Leech estimates somewhat more for 1890, namely, 174,556 kilograms; that figure seems to me too high for 1890, but may have been surpassed in 1891. So far as it is practicable at this day to survey the output of 1891, it may possibly reach 177,000 kilograms. That is to say, in the year of comparison (1875) the gold production was 169,540 kilograms, and in 1890 it was 167,346 kilograms; in 1891 there may possibly have been a rise of about 5.75 per cent.

These figures show the changes that have occurred in the gold production since fifteen years. Of the output for 1890, 167,346 kilograms, or in round numbers 168,000 kilograms, only about 74,000 kilograms belong to the younger alluvium. More than 13,000 kilograms come from the conglomerates of southern Africa; but as they lie in the depths, in the sulphides, and are worked by mining, they can not be numbered with the alluvium. Accordingly, for 1890, of the total amount, 44.2 per cent belong to the alluvium and 58.8 per cent to lode mining, though of the latter, 8 per cent are represented by old conglomerates.

Thus in comparison with older estimates we obtain:

	1848-1875.	1876.	1890.
	Per cent.	*Per cent.*	*Per cent.*
Lode mining	12.02	34.76	55.8
Alluvium	87.78	65.28	44.2

Or, if the conglomerates are mentioned separately, for 1890:

	Per cent.
Lode mining	47.8
Conglomerates	8.0
Alluvium	44.2

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[1] Report of the Mint, 1890, p. 274.

[2] John C. F. Randolph: Notes on the Republic of Colombia, South America; Trans. Am. Inst. Min. Eng., 1890, XVIII, pp. 205-213.

Of the increase for 1891 more than 8,000 kilograms belong to the conglomerates.

In 1875 the production was 169,540 kilograms, as has been said, being little higher than that of 1890, but at that time the washings entered with 65.28 per cent, while in 1890 only 44.2 per cent came from the alluvium. This circumstance is all the more remarkable because the Comstock lode has since become almost extinct. A large part of the alluvium of 1875 has become exploited. The discoveries made since, Witwatersrand (conglomerate) and the district of Barberton (Kaap), also Mount Morgan, in Australia, appear among lode mines; in Siberia new washings were discovered, it is true, but they merely took the place of extinct washings.

This 44.2 per cent forms the less reliable element in the output of the present day, but mining, too, has changed. Metallurgic processes, for instance, the better unlocking of the sulphides, act on the long run in a manner different from that of technical progress in mining, such as new drilling apparatus and explosives. The former increase the output, render poorer ores remunerative, and are of lasting advantage. The latter, so far as they cheapen labor, act similarly, but at the same time they hasten exploitation, and the higher annual figure of output is purchased by a shortening of the life of the works.

To this is added in many mines the hunger after dividends, which impels toward rob-mining. The so-called Washoe method, that is to say, amalgamation by the aid of common salt and copper vitriol, prevailed on the Comstock lode, despite the loss it involved, because it worked quickest. In many cases great enterprises were carried out with small capital. The participation of the workmen in the Comstock mines has already been mentioned. In Australia work is often carried on with shares of £1 each. This is true not only of gold mines; the silver mine of Broken Hill was entered upon with a capital of £384,000, based on shares of 8*s*. each.

Through the small face value of the shares it is easier to obtain the capital in the country; the work is in a manner democratized and the risk is distributed. A hazardous undertaking is more readily begun; then there is a demand for profit; but the owner is also inclined, if things go badly, to undertake trial work. So far as the figure of production is concerned lode mining has this advantage over work in alluvium that many mines are worked at a loss in the expectation of better finds, while an unfertile alluvium is quickly abandoned. Numerous specialists affirm that lode mining for gold, taken as a whole, is at this day working at a loss.[1] Topley says:

> If a steady and undiminished production of gold is essential for the wellbeing of the world, perhaps what we have most to dread is a sudden influx of common sense and prudence in the investing public; for this would at once close a great number of mines, and might considerably diminish the world's production. But probably this contingency is sufficiently remote to be safely left out of consideration.[2]

This complete change in the character of the gold production, however, does not change the fact that the production from the alluvial land alone determines the economic function of gold. The slowly flowing stream from the lodes, as will be shown, is almost consumed even at this day by the no less uninterrupted but rising demand of industry. The great quantities of gold in antiquity were derived from the alluvial land. The annual product of the present day is far below that of forty years ago, when the alluvium in California and Australia was entered upon, and without that alluvial gold all the recent troubles about the standard would probably not have arisen. In California the sudden and transitory character of the production from the alluvium would appear still more distinctly did not administrative conditions influence the production.

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[1] Reyer, California, p. 26; The Economist, April 11, 1891, even asserts the same concerning silver mining.

[2] W. Topley, Gold and silver, their geological distribution and their probable future production. Rep. Brit. Assoc. for the Advancement of Science, 1887, p. 535.

The figures of the production of the present day do not correspond to the demand; for a great and extraordinary enrichment of humanity, as after 1849, there is at present little prospect. The districts of Matabele and Mashona land have evidently been already picked over superficially. Mr. Bogdanovich kindly tells me that on the northern slopes of the Kuen-lün there exists gold-bearing sand in considerable quantities, and he has described the washings of Sourgak and Kopà on the southern border of the desert of Gobi, but the exploitation of these sites will in its time proceed probably just as slowly as that of the Siberian alluvium.[1]

Some hope for a rise in the gold production in the near future may exist in the case of California. According to rather general reports there is in preparation an agreement between the government of the State and the hydraulic works, according to which the State proposes to erect a catchment for the washed-off masses on a gigantic scale and to tax the hydraulic works for its erection. This would lead to a sudden rise, because the rest of the equipment of the works is in existence. In this way the present figure of the production of California might be raised for a number of years. As, moreover, the exploitation of the South African conglomerates proceeds more rapidly than the decline in Australia, it is possible that we may now witness a higher yield for some years to come.

The means of exploitation, too, have been improved; but all these circumstances are not decisive for the future. To-day, as thousands of years ago, the regions of gold extraction lie at the boundaries of civilization. In Europe hardly a few remnants of the former wealth have been preserved here and there. Only where virgin areas are entered is gold found in greater quantities. The more quickly greed drives man forward into the wilderness the more rapidly are the treasures exhausted, but we are approaching nearer and nearer to the end, and the transient rise in the annual output changes nothing at all in the final outcome. After a further experience of fifteen years I think myself perfectly justified in repeating, with even greater positiveness than in 1877, that, presumably, in a few centuries, the production of gold will diminish permanently and in extraordinary degree. But to-day, even more distinctly than at that time, events are telling that this metal, with constantly increasing rarity, will no longer be able to maintain its past economic position.

II.—SILVER PRODUCTION.

The production of silver is in an extraordinary position. It is influenced by the introduction of the furnace method in America, by the frequent shipment and mixture of ores, by the continued purchases of the United States Government. The figure given by Mr. Leech of 4,000,000 kilograms, of a value of $166,700,000, for 1890, shows its importance. The consumption of silver in industry vanishes in the face of the rising figure of production.

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[1] Pewtzow, Tibetanische Expedition, II. St. Petersburg, 1892, p. 113, etc., map D and profiles on Plate III; the site may be recognized on the map in Petermann. Geogr. Mitth. 1892, Taf. V, at the south margin of the desert, east and west of 84° east longitude Greenwich.

In 1877 I distinguished three groups of silver ores: those which yield silver in combination with lead, or with gold, or silver alone. The second group, comprising auriferous dry ores, has lost its importance by the decline of the Comstock lode. Its most notable representatives are certain lodes in Hungary and Transylvania. In America, owing to the decrease of the gold content, they pass over into the great multitude of dry ores which form the third group. The introduction of the furnace method, based on the combined smelting of lead ores and dry silver ores, prevents the establishing of the figure of production for the several groups.

In the gold and silver commission of 1887 the question was raised whether it be not possible to ascertain a minimum cost of silver production, which would represent the limit of production, and, therefore, also the limit of decline in market value. Prof. Roberts Austen at that time set forth the difficulties of this problem. He distinguished four sources of silver, to wit:

	Ounces.
1. From crude gold	508, 000
2. From lead ores	30, 726, 000
3. From copper compounds	7, 200, 000
4. From silver ores	49, 920, 733
Total	88, 354, 733

Group 4 comprises all dry ores that were subjected to amalgamation, including those of Comstock lode; a smaller part of the product from American furnaces is already comprised under 2. According to an approximate estimate Mr. Austen at that time conjectured that the cost of production for 1 ounce from lead ores was 2*s*., by desilvering of copper 1*s*. 11*d*., and that in the case of dry ores it varies within wide limits, but might amount on an average to 1*s*. 8*d*. At that time the value of an ounce was 4*s*. Of course in such estimates the works which are running in expectation remain out of consideration.[1]

This much is certain that even with the present silver prices capital is still invested in silver mining. The American Engineering and Mining Journal shows, according to the results of 1891, that some less productive mines with low contents, as at Butte, Mont., had been closed. But Granite Mountain, Montana, yielded 2,900,000 ounces at 51 cents, and the rich mines of Aspen and the San Juan district, Colorado, as well as Park City, Utah, work under 50 cents. The Mollie Gibson mine, Colorado, is said to have produced up to the end of 1891 over 2,000,000 ounces at 4.8 cents per ounce.[2] For Broken Hill 52.6 cents an ounce is estimated, including a sinking fund, but without profit from lead; but those works are now reaching the sulphides, and may decline somewhat.

The price of silver in the dollar has fallen in New York to 87–87.10 cents per ounce of fine silver. So long as the price is quoted at 87–87.10 cents and the cost of production in the ruling works is nearly 50 cents, the profit of the works may easily be measured. But the variety of the cost of production in detail, in the gossan or in the sulphides, in cerussite or galena, or in dry ores, appears from what has been said above.

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[1] Prof. Roberts Austen, Memorandum on the cost of production of silver; gold and silver commission, first report, append., VI, pp. 325-329, qu. 1198, etc.

[2] Eng. and Min. Journ., April 2, 1892, p. 369.

The gradual extinction of the gold production on the alluvium and the building up of a vast silver production in America might be foreseen fifteen years ago. In that phase we are still at the present day. Undoubtedly the silver lodes at greater depth will meet with the difficulties of high temperature; some dry ores may become depauperated in the lower portions, owing to increase of zinc blende. That has occurred for the present only in isolated cases. New lodes are found every year in New Mexico, Arizona, Mexico, and in other regions, and what Helms predicted in 1798 in Peru and St. Clair-Duport in 1843 in Mexico is now beginning to be realized. "The time will come, a century sooner or a century later," wrote the latter, "when the production of silver will have no other limits than those imposed on it by the constantly decreasing decline in its value."[1]

This limit, however, is as yet far from being attained, despite the considerable fall in price. Even at the present day, on the Andes of South America, dry ores are worked with profit, under the most unfavorable external circumstances. Even at the present day in Peru small smelting furnaces are in profitable operation, for which at these great altitudes there is no other fuel than the droppings of the llamas. In those regions there is yet ample room for lightening the labor.

It must be said openly that all hope of improvement in monetary relations through decline of silver production presupposes as yet a very material fall in the price of silver.

A rise in the price of silver would increase the profit, but would not greatly enlarge the production.

III.—CONSUMPTION OF GOLD AND SILVER.

The amount of gold annually consumed in the manufacture of ornaments, watches, gilding of various kinds, gold wire, and various branches of industry is very large, but can not at the present time be ascertained with accuracy. In order to ascertain the actual consumption, we should have to exclude the remelted old material, consisting of ornaments, etc., while melted coins from the active circulation are to be regarded as new consumption.

Nevertheless we possess some figures which invite conjecture regarding the total sum of consumption.

(1) The most accurate records are possessed by the United States, thanks to the efforts of its mint, continued for several years.

In 1890, according to the reports of Mr. Leech, the mints of the United States and the private refining works furnished to industry gold bars of the value of $14,605,901; this figure comprises $10,717,472 of domestic bullion, also $449,941 of domestic coin, and $362,062 of foreign bullion and foreign coin, but besides also $3,076,426 of old material. Deducting the latter figure, we obtain $11,529,475 = 17,348 kilograms. But aside from this, the goldsmiths are in the habit of melting down a quantity, not accurately known, of gold coins. Formerly, according to the information gathered in four different years, this amount was estimated at $3,500,000. If no decrease has occurred in this employment of coin, says Mr. Leech, then the value of the gold consumed in industry in the United States in the calendar year 1890 has been $18,105,901, of which $10,717,472 were new bullion. But since we here have to include coin also in the net consumption, we obtain $15,029,475 = 22,614 kilograms, as the loss suffered by the monetary uses partly through the consumption of new production, partly by the absorption of coin.[1] For 1889 that figure would be 20,922 kilograms.

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[1] A Zach. Helms, Tagebuch einer Reise durch Peru. 8vo, Dresden, 1798, p. 158; St. Clair-Duport, De la production des métaux précieux au Mexique, 8vo, Paris, 1843, p. 426; Zukunft des Goldes, p. 344.

(2) *Birmingham.*—In 1877 I was enabled, through the kindness of the secretary's office of the chamber of commerce of Birmingham, to state the consumption of gold in that city at 250,000 to 300,000 ounces. This did not include gilding and gold leaf.[2]

This consumption came under discussion also in the gold and silver commission of the British Parliament in 1887 and was by several authorities estimated. from approximate data, at £10,000 a week.[3]

Upon recent inquiry I received on May 8, 1890, through the kindness of the same chamber of commerce, the information that a specialist consulted by them, Mr. J. William Tonks, figures "the gold bullion, including the sovereigns and the American gold dollars, melted down in Birmingham daily for industrial purposes at not less than 400,000 ounces per annum," with the remark that this statement is rather below than above the truth.

This gives for the consumption in Birmingham 12,440 kilograms.[4]

(3) *Geneva.*—The manager of the refining works in Geneva, Mr. Ch. Lacroix, had the kindness to send me in 1890 and on March 22, 1892, information concerning the demand of the watch industry. The last letter says:

> Relying on our sales and on the figures of the federal control, I estimate the demand of Switzerland in 1890 at 14,000 to 15,000 kilograms of alloyed gold; that is to say, about 9,800 kilograms of fine gold. Of this I estimate that seven-ninths went to the watch industry and two-ninths into jewelry. For silver on the same basis in the same year the demand would have been 60,000 kilograms of fine silver. which was entirely taken up by the watch industry. For 1891 I estimate the demand for alloyed gold in Switzerland at 9,000 kilograms. that is to say, about 5,900 kilograms of fine gold, 7,000 kilograms being for watches and 2,000 kilograms for ornaments. Silver would amount to 52,000–55,000 kilograms, entirely for the watch industry.[5]

From these figures a quota is to be deducted for old gold.

(4) *Germany's* demand was in 1883 estimated by Soetbeer at 15,000 kilograms, of which 20 per cent was old material. In recent time an estimate gave 15,500 kilograms. If from this, too, 20 per cent is deducted, the remainder of 12,400 kilograms seems in comparison with the United States almost too small, and it is possible that many a gold piece finds its way from circulation direct into the workshop.

The demand for gold undoubtedly increases in Germany also; only the chamber of commerce of Hanau kindly answered upon inquiry that Hanau indeed consumed, in 1890, 3,000 kilograms of gold and 8,000 to 10,000 kilograms of silver, but that the consumption of gold had some-

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[1] Rep. Mint. 1891, pp. 52, 53.

[2] Zukunft des Goldes, p. 351.

[3] Gold and silver commission, first report; Sir Hector Hay, qu. 420; Mr. J. W. Birch, qu. 1371, and elsewhere.

[4] For this communication I am indebted to Secretary Haydon. Recently Mr. Ottomar Haupt (Economist, January 16, 1892) estimated this demand for England for 1857–1870 at £1,500,000 and for 1871–1890 at £2,000,000; that is to say, at about 11,000 and 14,600 kilograms. The former figure was also mentioned in the gold and silver commission. In reference to this it might, perhaps, be of importance to know how much is to be deducted from Birmingham for exportation.

[5] The first communication kindly sent by Mr. Lacroix, dated October 14, 1890, read as follows: "We take pleasure in informing you that our works furnished. in 1889, 6,800 kilograms of alloyed gold for the various demands of jewelry and for watch cases. Of these 6,800 kilograms, 4,700 were delivered in Switzerland. In order to alloy these 6,800 kilograms we used up—

	Kilograms.
Bars of old gold from remnants of workshops, old ornaments, etc	3, 700
Fine gold from refining works, etc	1, 400
Various coins	1, 200

"It is not possible for us to tell you accurately how much has been furnished during the same period by establishments of similar nature, but there will probably be no great error in assuming that that amount is one-half the product of our works. A number of banking houses sell fine gold or coins directly to the manufacturers, who alloy and melt it themselves. The estimate of this factor escapes us entirely."

what decreased, while the demand for silverware had increased considerably. The annual report ascribes the decline of the gold industry to the impeded exportation to America in general and to the Argentine troubles.[1]

(5) To these figures let us add the extraordinary demand of the *East Indies* for ornament and for hoarding, of which mention will again be made farther on. The net importation of gold, which for years has been flowing to that country, not only from England but also from the East, was in 1889 20,600 kilograms, in 1890 34,986 kilograms, and in 1891 not less than 41,259 kilograms, or 5,636 thousands of rupees. But to this is to be added the entire domestic production of gold, with 2,261, 2,970, and about 3,000 kilograms for 1889–1891, so that the actual receipts of India in those three years were 22,861, 37,956, and about 44,259 kilograms; that is to say, on an average 35,000 kilograms.

These five scattered items, United States, Birmingham, Switzerland, Germany, and India, by themselves, even with the notable deduction of old gold for Switzerland, lead us to a net demand for about 90,000 kilograms per year. Some time ago I estimated the total demand of the earth for art, industry, and hoarding at 100,000 to 120,000 kilograms. Dr. Soetbeer, in the article preceding his last, deducts the higher figure from the total production.[2] But even this figure is manifestly too small, for 30,000 kilograms cannot suffice for all the rest of the earth. France alone has been estimated at 15,000 to 16,000 kilograms, and then there are still unmentioned such consumers as Austria-Hungary, Italy, Spain, Russia, Belgium, Holland, and so many other regions outside of Europe, and not even the whole of Great Britain is included.

But if this figure is compared with the figure of the total production of 168,000 kilograms in round numbers for 1890 or 177,000 kilograms for 1891, it seems to me very probable that the demand for ornament, for industry, and for hoarding is close to the figure of production or has already reached it.

"The assumption," says Dr. Soetbeer, "that in the years recently past, together with the outflow to the East and the still prevalent practice of hoarding, industrial employment has materially checked the increase of the monetary gold stock and may presumably have nearly absorbed the yearly new production of gold, can not, it is true, be numerically demonstrated, but on the other hand just as little will it be possible to demonstrate its incorrectness."[3]

This view I share entirely, and it corresponds to the present condition of affairs. But the industrial demand increases from year to year with the increase of wellbeing. We have either already reached the day, or approached very close to it, when mining will yield less than industry consumes. From that day forward the whole new production no longer counts for monetary needs, and from that day forward industry will withdraw from the stock of money an amount of gold increasing annually with the increase of wellbeing.

IV.—THE STOCK OF GOLD.

In a paper directed against the bimetallic movement in England Mr. Rob. Giffen, in 1889, pronounced the opinion that the annual production of gold is almost entirely absorbed by industry and by India; that without India the fourth or fifth part of silver finds similar employment; and that in general the amount of gold and silver which serves for other than monetary purposes is wont to be underestimated. In this non-monetary condition gold and silver are said to be certainly nothing else than merchandise, and to be as little able to replace each other as wood and iron are; but the case is said to be not different with coined money, and consequently bimetallism an illusion.[1]

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[1] Jahresber. d. Handelskammer in Hanau für 1890, S. 6.
[2] Soetbeer, Edelmetallgewinnung, S. 542.
[3] Soetbeer, Litteraturnachweis, S. 285.

My remarks concern not these theoretical deductions of Mr. Giffen, but the facts which he presupposes. Gold and silver exist in three forms: as currency, as bank reserve, and finally, more or less immobilized, for instance as ornament. But these three divisions are not sharply separated. The bank reserve, covering a note, serves the purposes of actual circulation often even beyond its own value, and on the other hand there are reserves with the most diverse degrees of immobility, as shown by war funds, the Indian treasures, etc. Even our ornaments may in days of great distress find their way to the mint.

A great mistake is committed when money is considered merely as a medium of international payment and when the incalculable services are underestimated which it has to perform in domestic retail commerce. Here, it is true, the first glance shows that there are many states which in domestic commerce lack gold, but not one that does not use silver and copper. But even in the gold countries the gold is far too immobile to be able to enter into the finer arteries of commerce.

The lower boundary of the gold zone of commerce is the 10-mark or 10-franc piece, the half-sovereign. The reason for this, as has already been said, lies in the high value and at the same time in the high specific gravity of gold, which causes the volume to diminish. The zone of gold itself has but slight variety, and in commerce is wont to comprise merely this smallest piece capable of circulation and its double.

Below the lower limit of gold lies the broad and varied zone of silver, often widened out below by coinage below the standard. In this broad zone fall the daily purchases of the housewife, in the most advanced states the daily wage, and if the weekly wage actually brings a gold piece it has to be changed at once, because being gold it is not adapted to defraying the daily wants. It may well be said that to the zone of silver in all these states falls the greatest work; that is to say, with silver the greatest number of purchases and obligations are discharged.[2]

Copper is the companion of silver for supplying the fractional parts, and for the smallest commerce, and as a medium of circulation for the masses of the people is enormously more important than gold.

It is readily understood, too, that with the rise of the lower classes, with the increase of wages and of well-being, the demand for silver and copper for this reason must everywhere increase, even in gold lands. The report of the British mint states that in recent years far more silver coin had to be put into circulation, the new issue being, after deducting the compensation for recoinage, in 1889 about £1,579,125, and in 1890 about £1,070,475. But the demand for bronze coin was so great that in 1890 not less than 105 tons of disks for bronze coinage had to be procured through the mint company in Birmingham.

The German mint administration has the merit of having always devoted special attention to these needs. In fact it must be firmly kept in mind that the smallest purchase or sale is of the same legal value as the largest. The smallest obligation to pay demands its discharge with the same right as the largest. From this standpoint we must consider not only the value of the coins put into circulation by the state, but also the number of pieces.

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[1] Rob. Giffen, A problem in money, XIX Century, 1889, b. pp. 863–881.

[2] A table of weekly wages in comparison with the limit of the silver zone is given by W. Herbage, Economist, July 4, 1891.

The financial administration of the German Empire coined up to December 31, 1891: In gold, 2,587,100,000 marks in 158,800,060 pieces; in silver, nickel, and copper 516,000,000 marks in 1,948,000,000 pieces; that is to say, the value of the gold coined was about five times that of the other metals, but the number of pieces coined of other metals was thirteen times as large as the number of gold coins. But the actual condition of the metallic circulation must show far more unfavorable relations for gold, for a good deal of gold emigrated or was melted down, and besides the coining of silver there are yet some hundreds of millions of marks in old thalers to be taken into account.

This greater immobility of gold is also expressed by the fact that in England the half sovereign travels farther toward the periphery of the kingdom than the sovereign, and that gold in general remains more in the vicinity of the centers of commerce. Mr. Will. Herbage states that the public at the depositories in London prefer the larger coin, and that the proportion of the sovereigns and half sovereigns paid out is as 81 : 19. Outside of London the proportion in England and Wales sinks to 75.6 : 24.4, and in the remote parts of Scotland and Ireland it is completely reversed. Thus in Ireland it becomes, in Armagh, 10 : 90; in Cork, 9 : 91; and in Scotland, in Dunfermline, 10 : 90, and in Wick, 3 : 97.[1]

Thus the heavier gold coin remains near the center; the lighter one is preferred at the periphery.

The most instructive data for judging of the actual conditions of the metallic circulation are offered by France.[2] On the evening of April 22, 1891, at some 20,000 public depositories in France and Algeria, and in numerous banks and money institutes the cash receipts in notes and in gold, 20 and 10-franc pieces, and in silver 5-franc pieces were counted; in 1868, 1878, and 1885 similar counts had been carried out. The count of 1891 comprised 120,000,000 francs, or inasmuch as the reports of some banks were not quite complete in regard to the year of coinage, about 100,000,000.

Eighty per cent were received in notes and 20 per cent in metal; this relation in 1885 had been 68:32; the circulation of notes therefore has increased.

The proportion of gold to silver was 70:30; in 1885 it was also 70 : 30; thus there exists equilibrium between the two metals.

The notes behave in a manner quite similar to that of gold; they appear toward the centers, where the payments are made in larger amounts, and they dwindle toward the periphery and toward the regions of less commerce. At the Bank of France only 4.51 per cent were paid in metallic money; at the Bank of Algeria only 3.61 per cent; on the other hand, in the Dep. Ain, 45.65; Doubs, 43.59; Morbihan, 48.33; Corsica, 50.890; Haute Savoie, 59.47. In similar manner, though not in exact local agreement, it is seen that toward the less wealthy districts the payments in gold decrease and those in silver increase, and a map accompanying the official report shows how, from Paris outward, on the one hand toward the northwest in Morbihan, Finistère, and Manche, and on the other hand toward the south, up the Loire and toward Haute Savoie, the payments in gold sink, step by step, below 50 per cent.

In a general way the more active circulation of gold in the vicinity of the point of gravity of commerce agrees entirely with the information obtained in England, and as in France the note circulation is considerable, it takes the place of gold in large measure in these payments.

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[1] W. Herbage, *ibid.*

[2] La composition de la circulation Monétaire de la France; Bull. de Statist. et de Législat. comp., XV, Paris, 1891, pp. 121–150.

Incidentally the French count is remarkable also by the showing of the remarkable quantity of foreign coins. Not only the gold pieces of the Latin Union, but also those of Austria-Hungary, Russia, and Spain, are here in legal circulation, and the count of 1891 showed 1,871,860 francs of foreign gold; that is to say, 11.44 per cent of the total circulation. The foreign gold trickles in and remains; Austro-Hungarian gold pieces were used on that day in payment as far as Algiers, Constantine, and Oran.

Mr. de Foville profited by this count in order, from the nature of the payments, to draw conclusions, in an ingenious way, concerning the total amount of the monetary possessions of France in precious metals. According to him these possessions at that time were 3,000,000,000 in 20-franc pieces and 700,000,000 francs in 10-franc pieces, and specifically in 20-franc pieces 2,550,000,000 of French, 240,000,000 of Belgian, and 150,000,000 of Italian coinage. This would comprise only 50 per cent of the pieces coined in France since 1803, 50 per cent of Belgian, and 37 per cent of the new Italian coinage.[1]

If de Foville's presuppositions are applied to the Austro-Hungarian fraction of the gold circulation there current, it would result that about one-third of the 20-franc pieces coined by Austria-Hungary are at this time in France. The proportion of the 20-franc pieces coined in Austria-Hungary to the 10-franc pieces was as 18.44:1. The figures found in France were 8.8:1. According to this the smaller coin would remain in active circulation twice as long.

The examples mentioned show how the gold coin starts from the center of commerce, how its high value prevents it from penetrating into the finer arteries of retail commerce, and how in the peripheric portions of the State also it does not reach the same degree of infiltration into circulation as in the center. They also show how in France the gold, precipitated as it were by the notes from the current circulation, sinks to the bottom and gathers in the great reservoir.

The accumulation of gold in the Bank of France and in the German Imperial Bank has been looked upon as a sign of an abundance of metal. That is an error, as is expressly recognized by Mr. Soetbeer in his last book. The substitutes of the banks, checks, notes, also the gold certificates issued by the United States, are probably the main reason for the accumulation of gold.[2]

At the same time Soetbeer gives the following figures:

Monetary gold status of the banks in 1890, 6,000 million marks (2.15 million kilograms); 1891, 6,700 million marks (2.4 million kilograms).

Gold production 1851-'90, 20,000 million marks (7.2 million kilograms).

In the pockets of the public, after an estimate which is rather much too high, 7,300 million marks.

Loss in four decades (industry, East Asia, etc.) probably much over 6,000 million marks.

Assuming now that these figures are correct (and we have to regard them as a conscientious attempt at approximation, undertaken by a master) the question arises: Where is the great stock of gold which humanity is said to have accumulated from generation to generation through millenniums?

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[1] A. de Foville, L'Economiste francais, 5 et 19 Sept., 1891. The numbers following contain a discussion between de Foville and Ott. Haupt, which relates to the amount of silver circulation in France. France by the way, has also taken up a very large part of the debased fractional silver currency of Italy. Some years ago a part of this was sent back to Italy, but flowed again into France. Italy therefore is at present striving after an independent fractional silver currency, whose fineness is to be still less than the present (0.835); but this is at variance with the regulation of the Latin Union.

[2] Soetbeer, Litteraturnachweis, p. 291.

If the sum total of the bank reserves and of the active circulation in gold is not even equal to the production of the last forty years, but falls almost one-third below it, where then are the remnants of the former riches?

First, there is the loss by use itself.

Pfaundler has met the theorem of the indestructibility of matter by the question whether matter really admits of unlimited repetition of use, or whether it is not finally brought to a terminal condition in which, though it exists, it has yet lost all value for our purposes.[1]

This certainly is true in high degree of gold. The English gold pieces coined before the accesssion of Queen Victoria showed so marked wear that they had to be withdrawn a short time ago. In the sovereign the loss proved to be 2.236 grains, in the half sovereign, which may have circulated more, 3.046 grains. But it is not only the "Previctorians" that show such losses. In June, 1891, Mr. Goschen called for £400,000 for the purpose of recoining Victorians that were no longer of full weight. True, the English gold coin is not $\frac{9}{10}$, but $\frac{11}{12}$ fine, and therefore a little less capable of resistance than most European gold coins. But that which took place in this short period in England has taken place since the existence of gold coins among all nations, and the losses are very considerable. History, in fact, tells that several times a great scarcity of gold occurred in Europe, doubtless produced not merely by war and hoarding of treasures, but also by wear and by lack of supply.

In the second place there is the loss through industry, ornament, and hoarding.

The great demand of the present day has already been mentioned. The sum of the quantities of gold immobilized in civilized countries, for examples in watches, gilt frames, etc., is certainly very large. One part of it could only be made current on a large scale by tremendous crises, another part never. The amount that has been accumulated in Asia we do not know. Even if Giffen's statement is correct, that the immobile amount of gold is greater than the mobile, yet that mass remains actually dead for the purposes of the world's commerce.

The existing monetary stock in gold is overestimated, especially in comparison with the tasks incumbent on it.

And now if the precipitation of the circulating gold by fiduciary papers continues at the same rate as hitherto, if no supply is furnished from the production, then there must occur scarcity in the visible circulation of gold. And if simultaneously in the internal commerce of the nations the demand for means of commerce in silver and copper rises from year to year, then the best-ordered States are advancing toward a condition in which the ostracized silver and copper will actually circulate and work, while the gold, no longer visible in circulation, owing to insufficient quantity, will form the foundation, growing more inadequate from year to year, for the huge towering structure of credit papers.

The present needs of human society, the incessantly expanding commerce of the nations, the increasing population and the growing prosperity, the activity of internal transportation, the creation of great new commonwealths through colonization, the transformation of natural economy into financial economy, which is constantly progressing even in Europe and down to the present day, can only be satisfied by a value-measuring metal, which also is produced in annually increasing quantities.

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[1] L. Pfaundler. Die Entwerthung der Materie; feierl. Sitzung d. k. Akademie in Wien, 30 Mai 1888 S. 232.

CHAPTER VI.

COPPER.

EMIR ABDULLÂHI—THE COPPER RING IN PARIS—LIMITS OF THE QUANTITIES OFFERED BY NATURE.

In the course of the past few years copper once chanced upon the honor of possessing forced circulation. When, in May, 1886, the Egyptian troops had evacuated Harar and had left a considerable quantity of Remington copper cartridge shells, the new ruler, Emir Abdullâhi, had these shells coined into money, and he ordered the brokers to exchange the silver thaler for 21 pieces of such copper coins. The edict began with vehement declarations against usury, and thereupon every one who did not obey the order to accept the forced money was threatened with flogging or imprisonment.

Paulitschke, who soon after visited the town, tells us that the consequence of this forcible introduction of a wretched coin was a tumble in the value of all property; that the Gallas of the neighboring districts kept away from the market, and that hence arose distress and embarrassment.[1]

But how far does the action of Emir Abdullâhi, who knew how to usher in his arbitrary stroke with pious words, fall short of what was concocted at the same time in Paris for the purpose of raising the price of copper?

In the same year, 1886, a number of persons had combined in Paris for the purpose of artificially raising the price of tin, and more especially afterward that of copper. They concluded numerous contracts relating to tin, and they succeeded in fact, in 1887, in forcing it to the unheard-of height of £170 in the London market. But in the spring of 1888, as a consequence of this price, a diminution of the consumption became apparent, which continued even at £166. The undertaking broke down, and on May 10, 1888, the price of tin in London was £79 12*s.* 6*d.*

Undiscouraged by this failure, Paris speculators turned with still far greater resources to the project of forcing up the price of copper, and for this purpose a network of purchases and mutual obligations, embracing the whole earth, was woven. The most comprehensive historical account, besides the report of the Comptoir d'Escompte in Paris, was given by the chief of the bureau of mining statistics of the United States, David T. Day.[2]

The proceeding, in a general way, was as follows: The Société des Métaux in Paris and the producer agreed for the next few years on a maximum of production. For that amount the société guarantied a price which in England varied between £60 and £65, and in North America amounted to 12 and 13 cents. Any profit above this price was to be shared by the two contracting parties. On this basis agreements were made with the largest Spanish producers, with two companies at the Cape of Good Hope, then for the product of Venezuela, the Canadian mines, the most important Australian works, the largest work in Japan, then with Panulcillo in Chile, and almost all the larger companies on Lake Superior, in Montana and Arizona. The total production of the earth at that time was estimated at 275,000 tons (long tons), and the extent of this combination at 175,000 tons.

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[1] Ph. Paulitschke, Harar, 8vo, Leipzig 1888, S. 389; also Boll. Soc. geogr. Ital., XXIII, 1886, p. 398.

[2] David T. Day, Mineral Resources of the United States; calendar year 1888, p. 43, etc.; a review of the copper production at that time is given by J. H. L. Vogt, Om Verldens Guld-, Sölv-og Kobber-Produktion in Zetterstedt, Nord. Zeitschr., 1889.

Along with this there existed, under the name of the French Syndicate, but connected with the Société des Métaux, a second group of contractors, which had got 40,000 tons under its control, so that the whole influence extended to 215,000 tons; that is to say, to about 78 per cent of the total annual copper production of the earth.

This undertaking, as has been said, had already been begun in 1887, when the tin ring was still in existence. In North America resistance was made to the artificial raising of the price. This resistance was broken by an accident—a great fire in one of the most important mines on Lake Superior—and the price of copper began to rise. To Dr. Day belongs the credit of having pointed out already at that time, along with various other calm thinkers, that the cost of production of copper on a general average is £52 to £55 in England and 11 to 12 cents in America, and that the attempt to keep the price permanently higher would not succeed. But such words were not listened to. The president of the Rio Tinto Company, which works Spanish ores in England, was able already at the annual meeting of 1887 to announce that for 1888, 1889 and 1890, for the entire copper production of the company in excess of current obligations, an agreement had been entered into which would make it possible to obtain for the expected annual production of 26,000 tons, instead of the prevailing price of £48 per ton, a price some £20 higher.

The South Africa Cape Copper Mining Company, with headquarters at London, at its annual meeting confirmed an agreement with the Société des Métaux for the three years mentioned, in which the annual profit of the Cape Copper Mining Company was estimated at £220,000 to £230,000.

The Namaqua Copper Company, also of South Africa, entered into a similar agreement, and its president estimated the gain which was to arise thence to that company for 1888 at 30 per cent, for 1889 at 38 per cent, and for 1890 at 46 per cent of the company's total capital of £200,000.

The South American Quebrada Railway Land and Copper Company, Venezuela, figured its gain from a similar agreement with the Société des Métaux for 1889 at £61,530, and for 1890 at £53,994.

It is useless to multiply examples. We see the nature of the several meshes of the great network in its spread. Soon it was to be drawn together. The sale on the various markets began to slacken because supply became scarcer. Prices rose; but as they rose the following facts were observed: First the demand shrunk; next old material was sought out, copper roofs and kitchen utensils were bought up, much invisible store came to light, and those smaller works that did not lie within the circle of agreement, especially those that obtained copper as a by-product, raised their production with great advantage. Thus, for example, the extraction of silver-bearing copper pyrites in Montana received a powerful impulse, and in Montana the product both of copper and of silver has since then been materially higher.

The advances which the Comptoir d'Escompte had to make to the Société des Métaux became multiplied, and already toward the end of June, 1888, that comptoir was obliged to pawn in the Bank of France part of the copper warrants received as security. In September the comptoir, it is stated, demanded a settlement of account with the société and the syndicate. In December an unsuccessful attempt was made to transfer the whole enterprise to an English company. Many attempts and incidents followed and failed. On March 5 the manager of the Comptoir d'Escompte killed himself. On the very same day the mine owners in New York met, refused further delivery, and proposed a contraction of their output by 20 per cent. Thus was the collapse accomplished. The assignees on March 31 submitted an account in which the liabilities of the Société des Métaux were figured at 293,325,330 francs.

During this time the prices of copper had to undergo the most extraordinary variations; the whole consumption of the electric companies, for example, was thereby materially influenced. Toward the middle of September the price of the warrants for Chile bars had risen to £115, and then, in consequence of the straits of the société, declined to £78. When the crash came, the producers had to deem themselves fortunate because a large part of the stock of copper was held as security by the Bank of France, which sold out forbearingly and slowly, so that it was possible to keep the price between £40 and £50, and to save numerous industrial enterprises from wreck.

An extraordinary increase of the demand, for example, for electric apparatus and for vine culture, inasmuch as the sprinkling of the vines witl. copper vitriol has quickly acquired wide prevalence—not to speak of the war in Chile—came to the assistance of the works, and at the present day the total production of the earth is at least 300,000 tons. Of this the United States alone produced, in 1891, 130,634 tons and consumed 94,116 tons, and the demand there which was in 1870, 0.6 pounds per head of the population, was, in 1891, 3 pounds.

But now we are led to the following reflection: The production of the greatest copper works of the earth was, in 1890, 270,485 tons, at £54 1*s*. This gives a total value of about 365,500,000 francs; and with a total production of 300,000 tons this value would be 405,000,000 francs. The total value of the gold production in the same year was about 570,000,000 francs. It was possible for reckless men in Paris to get 78 per cent of the copper production into their hands, and in so doing incur liabilities amounting to almost 300,000,000 francs. The figure of the mine product is given; the figure of the amounts which are available for unbridled play is elastic and expands in a manner undreamed of.

In an attack upon the gold it is not necessary to turn to the mines and to make agreements with them concerning the limits of production. The copper ring burst because invisible store was transformed into visible and old copper came upon the market, a proof of how strong were the fetters imposed. Gold, too, in proportion as the figure of consumption approaches that of production, is all the more exposed to dangers unknown to former periods, and which deserve the attention of statesmen.

At the same time this ring gives a new instance of the limits which nature has set to the wealth of its gifts. Man's control of his planet has reached a point where these limits must never be lost from view.

CHAPTER VII.

THE BRITISH EMPIRE.

CANADA—SOUTH AFRICA—AUSTRALIA—INDIA—THE MOTHER COUNTRY.

The United States Secretary of Agriculture, Mr. Rusk, said last year: "In Europe science labors for the development of war; with us for the development of agriculture."

The Austrian representative, Dr. Peez, wrote not long ago concerning the possibility of a "walling in of Europe."[1]

In fact Europe is in an extraordinary, nay, an unheard-of, position. She passed through the most frightful wars in former times, and never were they followed by a state of affairs like the present. The United States waged a bloody civil war; then came peace. To-day in Europe it is different. Along with friendly esteem between individuals there lowers profound mutual distrust between the governments. A considerable part of the economic force has for two full decades been consumed in armaments; hundreds of thousands of men remain withdrawn from productive work; gold is stored up, just as powder is stored up, for the purpose of waging war, being withdrawn from commerce. Not a single nation can escape this ban, and the question remains whether future historians will regard this condition of affairs as a masterpiece of enlightened statesmanship or rather as a proof how difficult it is to secure recognition to the community of interests, even where it is palpable.

For in the meantime the rest of the world prospers. The figure of its population, its capabilities, its railways, its harvests, its well-being are increasing. The exportations and the capabilities of Europe, too, are rising, but not at the same rate. Mr. Goschen, chancellor of the exchequer, but now, on April 11, in submitting the English budget, recognized the depression of economic life.

Before me lies the map of the British Empire recently published by Lord Thring.[2] It is a civic structure that has not its like and never had. It is spread in every quarter of the globe. One continent, Australia, it embraces entirely. There lies the mother land, and around it are ranked the daughter colonies and the mixed colonies, the dependencies, protectorates, spheres of influence, and the scattered military and economic outposts. In the midst of the archipelago of the Pacific lies the coaling station of Viti Levu; in the midst of the Indian Ocean that of Diego Garcia; the lines of British steamers traverse all the seas.

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[1] Al. Peez, Europa aus der Vogelperspektive, 8vo, München, 1889, S. 69 (from the Münch. Allg. Zeitung, No. 129, etc.).

[2] Lord Thring: The consolidation of the British Empire; Scottish Geogr. Magaz., VIII, 1892, pp. 61–72. Map.

This Empire possesses in the Bank of England the center of the gold circulation of the globe and its only free main artery. It comprises two of the most important gold-producing lands, to wit, Australia and South Africa—inasmuch as the South African Republic is seen to be practically included in this whole in an economic respect. Furthermore, it possesses India, which has the silver standard. The antagonism of interests arising from the different valuation of the precious metals finds distinct expression within this sphere.

The political connection of these various areas with the mother country is diverse. First, there are three great colonies having parliamentary representation, to wit: Canada, South Africa, and the Australian states. They administer their internal affairs independently under a governor appointed by the mother country, who, however, is more or less responsible to the colonial parliament. With the exception of a few ships recently acquired in Australia they have no army or navy, and are restricted in regard to external politics. All these colonies have surrounded themselves against the interests of the mother country with protective tariffs, and from these tariffs derive a considerable part of their revenue. New South Wales, the last to cling to free trade, has now gone in the same direction.[1]

For some time back the sentiment has been awakening in England that this relation to the mother country is hardly tenable. "A Briton," wrote Sir Charles Dilke, in 1868, "does not understand why our artisans and merchants should be taxed in aid of populations far more wealthy than our own, who have not, as we have, millions of paupers to support. * * * Canada is, in all ways, the most flagrant case. She draws from us some £3,000,000 annually for her defense; she makes no contribution to that cost; she relies mainly on us to defend a frontier of 4,000 miles, and she excludes our goods by prohibitive duties at her ports.[2]

It was on the ground of thoughts like these that in recent years in England the "Imperial Confederation League," and later on the "United Empire Trade League," came into life. Men cast about for means to consolidate the Empire. The movement succeeded in inducing the Government in 1887 to assemble prominent statesmen from the colonies in London. Attention was mainly given to questions relating to right of trade, postal connections, and the like, but yet the South African Hofmeyer found opportunity, amid general sympathy, to develop a plan based on differential duties in favor of commerce with the mother country. This proposal met with decided resistance in all free-trade circles. It disappeared for some time, and a kind of defensive and offensive alliance seemed now to be the aim; the Austro-Hungarian delegation was also drawn in for comparison. In recent time the commercial union has once more come to the foreground. The most-favored-nation clauses of the commercial treaties with Belgium and the German customs union of 1862 and 1865 were opposed to these endeavors. In June, 1891, Lord Salisbury declared before a deputation that he would profit by the first suitable opportunity to remove these clauses. On September 1, the united chambers of commerce of the Kingdom unanimously adopted a resolution demanding closer commercial relations with the colonies. But the articles of import from the colonies are raw produce and food stuffs, and it is very much to be questioned whether the English Parliament would be willing, in deference to these political aims, to risk an inevitable rise in the price of wheat, for example. For many other articles the differential duty is of no value, because England is already drawing its supplies from the colonies, especially the wool of Australia and South Africa.

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[1] For details I refer to the book by Alfred Caldecott, English Colonization and Empire, which appeared in the series of University Extension Manuals, 8vo, London, 1891.

[2] Sir Charles W. Dilke, Greater Britain, a record of travel in English speaking countries, 8th ed., London, 1890, p. 385, etc.

For the present no actual changes have occurred; it will be in order to watch attentively any steps on the part of the English Government against the most-favored nation clauses spoken of; but in the meantime events in the colonies seem here and there to be tending rather in opposite direction.

The present Canada, whose oldest nucleus is formed by the French colony of Quebec, acquired by England in 1763, has resulted from the progressive union of smaller aggregates of states, which continue as seven provinces. In 1867 the present constitution was called into being. Newfoundland remained outside the union. The further development of things is influenced by the fact that Canada is in immediate contact along its frontier with a great political body identical in language and origin.

The center of gravity of the foreign trade of Canada lies not in England, but in the United States. Economic interests point southward. The figure of the population at the last census did not show the expected rate of increase, and the surmise exists that many immigrants subsequently turned to the United States. The increased tariff of the United States has rendered the situation more acute. The recently deceased governor, Sir John McDonald, had, for political reasons, antagonized the economic gravitation toward the neighbor at the south; he himself, in 1879, in order to meet the then hostile policy of the United States, and to increase the revenues of the government, had introduced the high duties which are now characterized even by the partisans of the Canadian government, such as Howland, as a lever for illegitimate influence of the administration, a source of abuse, and a badge of degradation of a free people.[1] In September, 1891, the Canadian parliament resolved unanimously to petition the Queen for the repeal of the most-favored-nation clauses of the German and Belgian treaties. The motives underlying this unanimity, however, were diverse. The leader of the opposition, Sir Richard Cartwright, in February, 1892, published in English papers a letter in which, indeed, the damnable character of the prevailing systems of high protective tariffs is branded in the strongest words, but yet their complete abolition is by no means pointed out as the aim of his party. Free trade with the whole world is said to be theoretically preferable, but free trade with the United States is said to be far more valuable for Canada than free trade with all other peoples without the United States. Hence it is said the aim should be to open the frontier in this direction, and to maintain the tariff against all other nations.[2]

We stand in the presence of one of the political consequences of the recent economic measures of the United States, of which we shall soon meet several others.

From a speech of the treasurer, Mr. Forster, February 22, 1892, it appears that Canada has now solicited the restoration of the reciprocity treaty of 1854 with the United States, and it is probable that Mr.

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[1] O. A. Howland, The New Empire; Reflections upon its origin and constitution and its relation to the Great Republic, 8vo, London and Toronto, 1891, p. 473, etc.

[2] The literal wording in The Economist, February 13, 1892.

Blaine has replied with proposals similar to those of Sir Richard Cartwright.

In Cape Colony the state of affairs is entirely different from that in Canada. In Cape Colony proper there live, besides 376,000 whites, 1,149,000 Bantu negroes, Hottentots, and other colored persons.[1] Toward the north all political life is in the first stage of formation, and the boundaries of states are frequently displaced. Diamond pits and gold-mining at some points, especially at Johannesburg in the South African Republic, caused large settlements to grow up quickly, which, however, up to the present day lack the necessary communications; but far beyond them, in Mashona land, the colonizing work of the first settlers is already beginning. All these circumstances give to Cape Town a strong transit commerce, beside which only the trade of Natal and Delagoa Bay is of some importance.

In political respect the Europeans of Cape Colony by their geographic position are entirely thrown upon their own resources and their only external support is the distant mother country. From there the colony has already received loans to the total amount of over £20,000,000 for investments; it is a good sign for the increasing well-being of the colony itself that it is said to have recently floated within the country £900,000 at 3½ per cent for public purposes.

The lists of export and import indeed show many surprises. Thus, for example, it is stated that from 1865 to the end of 1890 considerably more gold was brought to Cape Town than was exported thence. The importation of gold coin within that period is set down as £8,118,301, the exportation at £2,372,841, in coin and only £1,803,527 in gold dust, although for the latter figure the possibility of shortage in manifest is pointed out. At any rate these figures, and especially the importation of £1,330,000 and £2,390,000 of gold coin in 1888 and 1889, show that the increasing commerce has absorbed considerable quantities of coined gold.[2] If things turn out favorably, it may happen here as it did in California; after the end of the gold production, there will remain in South Africa a well invested and colonized, gold-consuming land, with all the advantages and all the needs of such a land; but since the virgin area is here much larger than in California, the process may be repeated on a still larger scale. Imports into Cape Colony in 1890 were £12,500,000 and exports £11,300,000, but among the articles of import there are found for example agricultural implements for £422,000, and along with them considerable amounts for corn, flour, butter, and cheese, a contradiction which shows to how great an extent everything is in its genesis. The most important part of the export is diamonds.

The negotiations with "King" Lobengula, the recent travels of Lord Randolph Churchill with Mr. Cecil Rhodes, the formation of an armed force for Mashona, and the vigorous advance of the railway into the far North are as many signs of confidence and of the prevalent aspirations. The very indefinite condition of the northern boundaries may be an obstacle to the speedy internal consolidation of the incipient South African state.

Australia began its connection with Europe as a penal colony. As such, New South Wales, in 1788, received an independent administration. New Zealand was formally occupied by England only in 1840, in a race with France, which latter was outstripped by three days.

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[1] H. Wagner und Supan; Petermann's Geogr. Mitth., Ergänzungsheft No. 101, 1891.

[2] Witwatersrand Chamber of Mines, Ann. Rep. for the year ending 31 December, 1891 ..4to, Cape-Town, pp. 140, 141.

Victoria was formed in 1851 in consequence of the gold finds, Queensland only in 1859. But in these regions events mature quickly, and already in April, 1891, in Sydney, an assembly of prominent men from all the states of the continent, as well as from New Zealand and Tasmania, under the leadership of the premier of New South Wales, Sir Henry Parkes, adopted a constitution which is destined in time to unite all these colonies into a single political body.[1]

Wars have entirely spared these happy lands. Even the fights with the natives, owing to the defenseless condition of the opponents, except in New Zealand, remained short and without influence on the course of events. No social barriers checked the rise of the ablest. Sir Henry Parkes himself, who has just been mentioned, is a workman who came over from Birmingham. Free Europeans here freely gave laws to themselves, and the development of the Australian colonies gives many an instructive insight into the deeper-lying peculiarities of the present European.

First it may be remarked that the growth was very rapid. In 1821 there were numbered in all the Australian colonies 36,263 inhabitants (without the natives); in 1841, 213,176; in 1861, after the great gold finds, 1,250,212; 1881, 2,742,500, and 1891, 3,816,418. Queensland increased in the last decade 87.3 per cent, New South Wales 53.5 per cent, Victoria 67.7 per cent.

In 1851, while the California fever was still rampant, the first beds of alluvial gold had been found in Victoria. Hundreds of thousands of men flocked thither. The towns grew by the building up of numerous auxiliary trades. Soon the population divided into the industrial urban spheres, in which the wage worker was spokesman, and into the rural spheres of the squatters, which produced meat and wool. Already in 1856 the builders in Melbourne gained the eight-hour day, and step by step that practice extended to all the other colonies and to most trades. At the same time, at first mainly at the instigation of the gold diggers, there came the bills against the Chinese; then a bill against the colored laborers in the sugar plantations of Queensland, although white men can not stand the climate there; then homestead laws, insurance laws, laws against government aid to immigration in general, against the immigration of paupers, for restriction of the work of women and youthful persons, numerous laws for the protection of workmen, extraordinary powers for the trade inspectors; in a word, a system of laws aiming at the raising of wages and the shortening of the hours of labor, as well as the diminution of competition among workmen. In Queensland especially the doctrines of state socialism were realized as nowhere on earth. The results were high wages and many desirable philanthropic measures, such as protection to health, decrease of alcoholism, good schools, a highly developed system of insurance, especially in New Zealand, and many other things. But the dark side of this class legislation, influenced by the trades unions, is not wanting. The workmen apply their principles to their own private lives, and the censuses show in their circles a remarkable increase of Malthusianism. Along with the high wages there exist high prices for the means of living. The workingmen's party demands public works. "A vigorous public-works policy" hasbecome a watchword, and while railways are necessary to open up the land, yet their over-hasty construction produces heavy indebtedness toward England. This indebtedness demands in most of the colonies an increase of revenue from the customs, and this reacts on the prices of the means of living.[1]

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[1] Sir Henry Parkes himself sketched the outlines of the situation in The Union of the Australias, Contemp. Review, July, 1891, pp. 1-8.

Thus, despite this legislation, corresponding altogether to the class-bred wishes of the workingmen, friction ensued. In 1885 the "new unionism" was founded, which impugns the freedom of labor contract, in order to be able, in case of a strike, to control all the working force; and in 1890–'91 a widespread strike did in fact take place owing to this organization, which, however, ended in great loss and in the total defeat of the workingmen.[2]

Under these circumstances the public debt of Australia up to 1891 has risen to the extraordinary sum of £184,000,000, and Victoria alone, with 1,140,000 inhabitants, had to pay almost £3,000,000 in interest and sinking fund. Already, about the middle of 1891, there came signs of an approaching storm. It was noticed that the bank deposits of the government in Victoria had fallen in three years from £3,600,000 to £700,000, and that the indebtedness of the banks had increased. At the same time it was noticed that, in the first half of 1890, of the coinage of the mints at Melbourne and Sydney to the amount of £2,830,000 there remained yet £1,600,000 for internal circulation as compared to the gold export, whereas in the first half of 1891 almost all the gold had to go to England, because the coinage of £3,000,000 was only £116,000 higher than the manifested exportation of gold. In New Zealand an income tax on the government debt was proposed. New Australian loans met with a churlish reception in England, while in Australia lively speeches were held against capitalism. The Bank of England, on account of the expressions used by the treasurer of Queensland, broke off all relations with the administration of that colony.

Toward the close of the year Sir Henry Parkes resigned his office. The protective-tariff party now became victorious in New South Wales also. Several Australian states, being unable to borrow money in England, began to issue treasury bonds, New South Wales, Victoria, and Tasmania being among the number, and the rate of interest for the intended issues was raised from 3½ to 4 and 4½ per cent.

While other parts of Australia showed a surplus of exports, in Victoria, from 1886 to 1890, a deficit of export of almost £46,000,000 had run up, and on November 30, 1891, in the capital, Melbourne, the crisis broke out in the financial circles, while the workingmen's circles were suffering from the consequences of the unsuccessful strike. Numerous undertakings broke down. The Parliament passed a sort of general letters of respite.

The stream of loans which had for years flowed from the mother country into Australia was checked, and the consequences would have stood out still more sharply had not the balance of trade improved, owing to an increase in the exportation of agricultural products.

The balance of trade for 1890 had shown a total exportation of £64,600,000 and a total importation of £67,900,000, although all the colonies with the exception of Victoria showed a surplus of exports. In 1891 the exportation from Victoria increased by not less than £2,400,000, and all the other export figures were higher. The exportation of sheep's wool rose from 308,000 to 413,000 bales. The greatest stride was made by New Zealand. For the administrative year closing with September 30, 1891, the exportation rose to £10,000,000, with an importation of £6,380,000. The exported frozen meat, if the cattle be converted into sheep, attained the extraordinary amount of more than 2,000,000 sheep, at 60 pounds apiece, and the exportation of sheep's wool from that island alone rose in four years from 89,000,000 to 108,000,000 pounds.[1]

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[1] A very instructive description is given by Steph. Bauer, Arbeiterfragen und Lohnpolitik in Australasien; Jahrb. f. Nationalökonomie und Statistik v. Conrad und Elster, 3 Folge, II Bd., 1891, S. 641–706. I will refer also to letters in the Times, for example, February 2, 1892, and to the many reports in English professional papers, and, for the consequences of one-sided government by the workingmen's party, to Ch. Fairfield, State socialism in the Antipodes (in: A plea for Liberty, by var. authors, ed. by Thom. Mackay, London 1891), and J. W. Fortescue, The seamy side of Australia, XIXth Century, 1891, I, pp. 523–537; H. Willoughby, *ibid.*, pp. 292–302, and Fortescue, Guileless Australia, *ibid.*, pp. 430–443. In 1890–'91 New South Wales had 3,500 and Victoria 1,660 kilometers of railways; the latter especially had run far ahead of the demand.

[2] Two participators have described these events from different standpoints: H. H. Champion, The crushing defeat of trade unionism in Australia; XIXth Century, 1891, I, pp. 225–237, and J. D. Fitzgerald, Mr. H. H. Champion on the Australian strike, *ibid.*, pp. 445–453.

Thus Australia, aside from its first phase, shows a typical sequence of those scenes which develop, as it were, out of themselves: Gold, inrush of men, social experiments, headlong investment, debt, and protective tariff; demand for confederation of the smaller states, financial crises, decline of the gold production, beginning of success of investment through increased exportation of raw products. That is, at the same time, the beginning of improvement. The debt is then no longer paid with high customs receipts, but with the products of the land. Soon thereupon approaches the next phase, in which Australia will begin to work up an ever-increasing quantity of wool in the country itself, and to transform Australian iron ores into rails on its own coal measures. But that is economic independence, beside which political independence is merely a question of time.[2]

The three units just described, Canada, South Africa, and Australia, are, with the exception of the United States, in which special conditions prevail, the only large areas outside of Europe in which the gold standard is in use. The course of development that has just been described for Australia remains pretty much the same. Canada possessed the least gold, and has progressed farthest; it already possesses in Toronto a great industrial town. Australia is in a middle phase; the gold is decreasing and the exportation of the other products of nature is increasing. South Africa is as yet in the period of rising gold production, but the great lines of the future may be foreseen.

In the United States the view prevails that the connection of the colonies with the mother country rests mainly on the filial remembrance of the immigrants, which is absent in the second generation. One is told, therefore, "that in the colonies every five minutes an Imperialist dies and a Republican is born."

But the question of the political severance of these units from the mother country, as far-sighted English statesmen recognized long ago, is not the essential point in the course of things. On the contrary, the essential point lies in this, that in the course of time they will attain complete economic independence, will become entirely free through increased exportation, and will even themselves replace the mother country in the more remote markets.

With the empire of India the three groups of colonies just discussed can not be compared either in number of population or in history or in respect of present conditions. There we find virgin soil, with far more gold, a feeble, retreating native population, parliamentary institutions and gold coin as in England; here we find a vast land of old, high culture, densely settled by a native population of diverse good endowments. a small number of Englishmen as the rulers of the vast realm, no parliamentary institutions, and silver coin.

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[1] The Economist, January 9, 1892, p. 39.

[2] Ch. Dilke, Greater Britain, 8th ed., p. 358: "If the Australian confederation leads to independence, we shall have to say to the Australians what Houma ta Whiti, in his great speech, said to the ancestors of the Maoris: 'Depart and dwell in peace; let there be no quarreling among you, but build up a great people.'"

This empire comprises 3,600,000 square kilometers. In 1881 there lived on this area 253,900,000 souls. But according to the census of 1891 that population has increased by 28,000,000, and, with the new acquisitions, the British empire in India at this day comprises 288,000,000 souls.[1] This is, perhaps, not less than the fifth part of the whole human race.

These millions belong to diverse races and religions, and speak diverse languages. The schools of the English have given to the Indians a common means of communication, exactly as some decades ago, at the beginning of the Slavic movements of the present time, the German language served as the medium of communication. Besides the schools, the English have also given to the Indians complete freedom of the press and of assembly, and a vast network of railways. About the middle of 1891 more than 27,000 kilometers of railways were in operation. In 1890 114,000,000 passengers and 22,000,000 tons of freight were moved (7,600 million kilometers for travellers and 5,600 million ton-kilometers). Thus, as in Europe, the most remote branches of these populations enter into personal and intellectual intercourse with each other. Native newspapers in large editions are carried through the land by the mail; a native merchant class has existed for thousands of years; a native great industry on European models is rapidly developing.

A measure for the resources and greatness of the empire is given by the circumstance that the imperial commissioner, Mr. O'Conor, in 1891, upon the question whether a threatening native famine would not be notably aggravated by exportation of wheat into Europe, was able to reply: In India 93,000,000 acres are planted in cereals, of these only 18,600,000 acres in wheat, these latter produce 7,000,000 tons of wheat. If 1,000,000 tons of wheat are shipped to Europe, that is only 2 per cent of the home demand for cereals.

Concerning the manner in which this empire ought to be administered by the small number of Englishmen, opinions differ widely. A group of statesman, in whom the memory of the heroic deeds of Lucknow and Cawnpore is still alive, who reëstablished the dominion of England during the last rebellion, emphasize the standpoint of authority and maintain the barriers that exist at present toward the natives. Another group, whose most prominent representative was Lord Ripon, recommend the more frequent admission of natives to public offices, nay, even to some share in the legislation for the whole empire. H. J. S. Cotton, an experienced official under Lord Ripon's administration, has admirably described the influence of advancing European culture on the Indians. "The danger" he says "lies in this, that by tardy recognition of these changes we compel the educated classes to extort their opportunity, before the country is ripe for such an event.[2]

Not this drift of reflections, but the movements of commerce under the influence of the divergence in the values of gold and silver, will I try to follow.

In so doing, all figures, so far as they do not relate to the movement of metallic gold, will be stated at the Indian face value—that is to say, in Rx^s or silver 10-rupee pieces, concerning which it is proper to note that 1 Rx^s differs from £1 by the exchange value of silver at the time, whereas 1 Rx^g is equal to £1. The following sums run in thousands of Rx^s.

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[1] These last figures I take from a correspondence in the Economiste Français of February 13, 1892, p. 204.

[2] H. J. S. Cotton, New India, or India in Transition, 2d ed., London, 1886.

In the following years, closing with March 31, the commerce (not including the precious metals) was as follows:

	1890-'91.	1889-'90.	1888-'89.
Importation	64, 720	62, 400	62, 407
Exportation:			
Indian products	89, 892	92, 907	86, 862
Reëxportation of foreign goods	3, 974	4. 027	4, 065
	93, 866	96, 934	90, 927

The year 1889 was the most favorable within the memory of man for the exportation of cotton, and, therefore, is hardly suitable, in its principal sums, for comparison.[1]

If the results of the calendar year 1890 are decomposed into groups, we obtain:

Group.	Country.	Importation.	Exportation.	Surplus.
1	Europe	54, 658	62, 942	8, 284
2	Ottoman Empire, Persia, Arabia, Aden, Zanzibar, Mozambique, Mauritius	3, 904	6, 264	2, 360
3	Sunda Islands (mostly transit commerce)	2, 441	4. 808	2, 376
4	Ceylon, Japan, China	3, 109	17, 471	14, 362
5	United States	1, 729	3, 768	2, 039
6	Australia	391	1, 072	681
	Total	66, 232	96, 325	30, 093

These figures show that India trades in both directions, with gold and silver lands, with a surplus of exports. But they also show that in that year (1890) the total commerce with Europe, 117,600 thousands of Rx^s. showed a surplus of only 8,284, while the total commerce with the other states, only 49,957, showed the surplus of 21,809 thousands of Rx^s. The center of gravity of the commerce, therefore, lies in Europe, but the center of gravity of the surplus of exports into other countries, or of the commercial gain of the land, lies in the other trade relations, especially toward Group 4 (Ceylon, Japan, China). The surplus of exports, therefore, does not correspond to the direction where lie the obligations arising from loans. This becomes still more striking when Groups 1 and 4 are further decomposed.

GROUP 1.

Country.	Importation.	Exportation.	Surplus.
Great Britain	50, 291	39, 129	−11, 162
The rest of Europe, without Ottoman Empire	4, 367	23, 813	+19, 446
Total	54, 658	62, 942	+ 8, 284

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[1] The last reports show for nine months (March 31 to December 31, 1891) imports, 37,201; exports, 55,770; reëxported, 2,333; total, 95.304. Large exportation of wheat; Germany monopolizes the entire salt trade. The importation of silver dropped to nearly half of the importation of the respective nine months in the preceding year.

According to these figures, the trade with England is even passive; that is the only passive item in the whole list. On the other hand we obtain:

GROUP 4.

Country.	Importation.	Exportation.	Surplus.
Ceylon	632	2, 314	+ 1, 682
Japan	28	1, 221	+ 1, 193
China	2, 449	13, 936	+11, 487
Total	3, 109	17, 471	+ 14, 362

China alone in 1890 furnished more than one-third of the surplus of Indian exportation.

These figures are influenced by a number of changes in favor of India that have occurred in the course of the past few years. While the most important active items of the Australian and South African trades in natural products belong to the animal kingdom (frozen meat, sheep's wool, hides) and to the mineral kingdom (diamonds, gold, silver), the center of gravity of the Indian exportation lies in the vegetal kingdom.

The tea culture of India and Ceylon competes successfully with that of China. From 1887–'88 to 1890–'91 the English importation of tea from India rose from 85,000,000 pounds (at 453 grams each) steadily to 100,000,000 pounds, that from Ceylon as steadily from 12,000,000 to 40,000,000 pounds, and at the same time the importation from China dropped from 86,000,000 to 57,000,000 pounds. At the same time India has gained the larger part of the Australian market for tea, and it is only the fall in the price of tea that prevents this revolution from appearing in the balances to the disadvantage of China. The exportation of tea from India in the past three years rose continuously; they were 97,000,000. 103,000,000, and 107,000,000 pounds; the value of this exportation has fallen; it was 4.937. 4.947. and 4,892 thousand Rx^{s}.

Tea is one of those numerous finer articles of luxury for which the gold lands are tributary to the silver lands, while the silver lands are competing with each other. It is different with those raw products from the vegetal kingdom that have thus far been shipped to Europe and thence returned as manufactures.

For more than a decade, India has turned with increasing success to the task of working the native cotton in the country itself, and to conquer for the coarser fabrics not only the domestic, but the entire East Asian trade.

From the last report of the spinners of Bombay that has come to my knowledge, there were in operation in India from July 1, 1890, to the end of June, 1891, 125 spinning mills, and 9 were in course of construction. The number of spindles was 3,351,694 and that of the looms 24,531. These factories employed 110,009 operatives and worked up 40 per cent of the cotton production of India, which is estimated at about 3,000,000 bales. In ten years the number of operatives has trebled, while the amount worked up has nearly quadrupled.[1]

In the three years 1888–'89 to 1889–'90 alone, the exportation of Indian cotton yarn to China rose from 101,000,000 to 150,000,000 pounds and in value from 3,829 to 5,406 thousand Rx^{s}. Despite this rapid development of the cotton industry, however, the importation of yarns from England to India had not undergone any notable change, because this concerns for the most part the finer grades. The *loss* for England consisted in the loss of the market in China.

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[1] Economiste français, October 24, 1891.

A similar process is being worked out in jute, a vegetal product furnished only by India. It seems that the use of jute has been known for a long time, and that the inhabitants in former time used garments of jute, which have now been replaced by other tissues. In consequence of the invasion of these better fabrics the hand looms that worked in jute were abandoned or used for the preparation of coarse sackcloth; later on samples came to Europe, and in Dundee this vegetal product was first used for many purposes instead of hemp. In 1832-'33 the exportation of raw jute from India was 11,800 English hundredweight; when in 1854-'55, in consequence of the Crimean war, the demand for such material rose, much more jute came to Europe, and, with continuous rise, the exportation in 1890-'91 reached about 12,000,000 hundredweight.

But just as India has begun to work up her home-grown cotton herself, so both English and Indian contractors have since 1854 introduced machines to replace the hand looms which produced sacks. With varying success this industry has been developed, the difficulties were finally conquered, and at the close of 1890 there were in operation 160,275 spindles and 7,964 looms; 70,000 operatives were employed; 500 new looms were to be set up in 1891. In 1890-'91 3,100,000 bales of raw jute were exported and about 1,200,000 bales worked up in the country. In 1891-'92 it is expected that 1,560,000 bales will be worked up into sacks and sackcloth in the domestic factories.

The cotton industry has its main seat in Bombay; the jute industry in the vicinity of Calcutta. The cotton yarns are exchanged in China in silver for silver, and the variations of the rates are absent. The jute sacks have to enter into gold lands. From August, 1889, to August, 1890, silver had risen 30 per cent; a good jute crop had supervened, and the price was 33 per cent less. Amid such oscillations the Indian jute industry has gradually conquered the markets in all the Pacific area, crowding out the European articles, as in Australia, New Zealand, San Francisco, and along the whole west coast of South America, and the same thing has taken place at the Cape, in Egypt, and the Levant. The Indian sacks are even pushing their way already as far as Liverpool.[1]

I have not the space to discuss the significance of the opium trade, the increase of the exportation of cereals, especially the erection of steam mills for wheat in Bombay, and the extraordinary expansion in the exportation of rice. Tea, cotton, and jute show what an awakening people, guided by enterprising merchants, are able to do. The surplus of the merchandise balance is in large measure equalized in India by inflowing precious metal. It is true that with the increase of well-being the requirements of a country also rise, and in this case that increase is expressed, for example, by the increasing importation of sugar from Germany; but yet the balance to be paid by foreign countries to India is exceedingly great.

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[1] Some notes on the trade in jute; the Economist, August 15, 1891; Trade Suppl., p. 7; also October 8 and 10, and November 14, 1891.

The net importation of precious metals was, since 1875, in the years ending with March 31:

Year.	Gold Rx^{g}.	Silver Rx^{s}.	Year.	Gold Rx^{g}.	Silver Rx^{s}.
1875	1,873	4,642	1881	5,462	6,405
1876	1.545	1,555	1885	4.671	7,245
1877	207	7.198	1886	2.762	11.606
1878	468	14,676	1887	2,172	7,155
1879	—897	3,970	1888	2.989	9,218
1880	1.759	7,869	1889	2,814	9,247
1881	3,655	3,890	1890	4,615	11,202
1882	4,843	5,379	1891	5,636	14,212
1883	4.930	7,480			

It will be noted that these figures, high as they are, are yet far below the surplus of the merchandise balance, which, in the last three years, was little less or more than 30,000,000 Rx^{s}. This is a matter of course, since the liquidation of the "council bills," that is to say, of the payment obligations of the Indian Government in London amounting to 10,000,000—16,000,000 Rx^{s}, and many other obligations, as well as other forms of equalization, are taken into account. Yet these figures reflect many an event. The greatest importation of silver does not appear in them. It fell in the year 1865–'66, and was a consequence of the cotton famine in Europe due to the American civil war. The Indian famine of 1877–'79 is expressed by the decline in the importation of gold, which even becomes passive for one year, while the loans required to meet the distress are denoted by the great silver importation of the year 1878. The rise of the silver importation in the last two years is connected not only with the favorable merchandise balance, but also with the silver speculation in America, which had its effect on England, and found a welcome drainage channel in the remittances to India.

But the stream of gold and silver flows on uninterruptedly. In 1890, says the report of the treasury, another 461 lakhs of rupees (1 lakh = 10,000 rupees) in gold came into the country, and of these only 2 lakhs came into the mint; all the rest disappeared in the multitude of the people. In the first half year there arrived in new sovereigns alone £2,000,000; they have disappeared. The demands of the rapidly increasing population, ornaments, and hoarding of property, absorb the gold.

But there are reports on hand which seem to indicate that the last importation of silver really was too sudden, all the more because the government toward the middle of May simultaneously put 1,000,000 Rx^{s} of new money in circulation. All deposits rose; the rate of interest fell to 2 per cent; the reserves mounted up to 60 to 70 per cent of their obligations. Great disturbances ensued, and finally, as stated in the official report of Mr. O'Conor, there followed "a general dislocation of legitimate commerce.[1]

From this the conclusion might well be drawn that in future India will endeavor still more to introduce gold, but the hoards of the country and the interior of Asia will in the end again absorb everything. The gold and silver commission appointed by the English Parliament has brought to light much information concerning the relations to India, and especially concerning the hoarding of treasures. Long misgovernment seems to be the cause of this practice. It prevails as far down as those lower classes which are able merely to keep ornaments of metal of inferior value. Of the treasure of the Maharajah of Burdwan, of his walled-up rooms, of the rooms that are opened upon special occasions (such as marriages in the family), and of the outer chambers that harbor the current receipts, a description has been submitted to the commission by Mr. Barbour.[1] These larger and smaller hoards in India are estimated at not less than £300,000,000 sterling, approximately in equal parts of gold and silver. Vain has been the effort to mobilize them by a network of postal savings banks; no greater success has been obtained by the railway and government loans, paying a higher rate of interest. In general, it is regarded as a point of honor not to touch the treasure inherited from one's ancestors. War and disturbance increase this propensity toward dead storage, and only the famine of 1877 and 1878 drove a somewhat larger amount of native ornament into the mint.

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[1] The Economist, August 29, 1891, according to the report of Mr. J. E. O'Conor.

Now, one might think that these rising figures of the rich trade balance, though accompanied by the embarrassments transiently resulting from too great wealth in silver, would satisfy everybody. But this is by no means the case. The land is enriching itself, but grave anxiety to the government grows out of present conditions. The country, simultaneously with the falling value of silver, is conquering wider and wider markets for its products, but the administration is suffering many and great losses. As the taxes are paid in silver the council bills have to be redeemed in London with great loss. Every requirement of the government, for instance for the Indian army, has to be paid in England in gold. The numerous highly deserving pensioners living in England receive their pensions in silver and have to defray their living expenses in gold.

The main item is the discounting of the council bills. Under existing political and social conditions the Government is not able to increase the taxes materially. Nevertheless, it has to make good the losses arising from the rate of silver, and it has already been obliged to trench upon reserves that had been laid by for the case of a famine. This example shows how little one is justified, in estimating the balance of payment of a nation, to regard the surplus of exports of merchandise and the subtractions through the contraction of debt as directly balancing each other. The hand of the producer which receives is not the same as that of the state which has to liquidate foreign debts.

In a dispatch of September 4, 1886, the Indian Government writes: "In no other way than that of international agreement can a lasting and satisfactory order be brought about, and we trust that Your Majesty's Government will give up its position of absolute isolation—a position which, we venture to believe, is indefensible in theory and in practice is fraught with danger both for England and for India." And in conclusion: "We do not hesitate, therefore, to repeat emphatically that, from the standpoint of Indian finances, the situation has become intolerable."[2]

All manner of propositions have come forward; Mr. Lesley Ch. Probyn has even sought help for India in those expedients for which in Austria the expressions "stabilization of standard" and "gold reckoning" have been invented.[3] This proposition has been, in the East India Association, in 1888, the subject of a discussion in which prominent members of the Parliamentary commission of inquiry, such as Herm. Schmidt and Naoroji, took part.

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[1] Blue book of the gold and silver commission, first report, 1887. Append. V, p. 322. Letter on the subject of the hoard of the Maharajah of Burdwan.

[2] Blue Book, 1887; *ibid.*, Append. XII, correspondence between the treasury, the Indian office, and the government of India, pp. 356 and 359.

[3] L. Ch. Probyn, esq.: A proposed Gold Standard for India; Journ. of the East India Association, Vol. XX, July, 1888, pp. 119–159.

None of these propositions have thus far been realized, but in the estimate for the Indian budget for 1891 the treasurer, Sir D. Barbour, declared that India would make its course of action depend on America. If America introduces the free coinage of silver then a greater steadiness will result for India also; if America gives up silver, then India must pass over to gold. "The adoption of the gold standard would probably be accompanied with very serious consequences for western nations, but if in this matter these keep in view only that which they regard as being to their own interests, then they can not reasonably blame India if she follows the same route."

Let us now turn to the mother country, the greatest market of the world, and at the same time the center from which the greatest movements of capital radiate. All the oscillations of the world's commerce make themselves felt here, and here it must become evident whether the present financial economy, so far as it has to be based on metal, is in a phase of healthy development or whether this is not the case. In the first survey I rely on the figures supplied by the professional periodical The Economist, with recognized accuracy.

So far as may be gathered from these figures, the year 1891, in all those directions that are influenced by a somewhat longer series of preceding years, can not be called an unfavorable one. Pauperism in this year, too, diminished; the state of the savings banks and the consumption of certain significant articles of luxury, such as tobacco, liquors, is satisfactory; and so, at least in the first half year, is the movement on the domestic railways.

The figure of the exported amount of merchandise is influenced by the over-hastening of exportation in 1890, when the protective tariff for the United States was in prospect, and for that very reason shows decline. The prices for exports have fallen by .93 per cent; that is to say, it was necessary to sell cheaper. The prices of imports on the other hand rose .5 per cent, but the increase concerned only breadstuffs, the higher prices of which in 1891 cost Great Britain £9,500,000. Wool, cotton, and other raw products of manufacture fell. The Economist remarks thereupon that a low price of raw products must in the end benefit the manufacturer, but that the period of decline is injurious, because the buyer estimates the merchandise by the price of the raw product at the time of completion. It may well be added that there is a probability of the longer duration of such a period if the fall of prices is more or less influenced by the divergence in the value of the precious metals. The average price of twenty-two of the most important articles of consumption, however, was at the end of the year 4 per cent less than at the beginning.

The total value of exports and imports is stated as follows:

	1889.	1890.	1891.
Imports	£427,600,000	£420,900,000	£435 700,000
Exports	248,900,000	263,500,000	247,300,000

It is self-evident that these figures do not signify an equal amount of loss by passive balance. The reëxportation has not been sufficiently eliminated. No account is taken of the great gain from the carrying on of the marine commerce under the British flag, which during the last decade rose from 37,000,000 to 61,000,000 tons, and comprises one-half of the commerce of the United States and of Russia. England, moreover, is the creditor of the other nations.

In this last direction, in which the conditions of money matters become still more directly manifest, the year 1891 was not a favorable one. The crises of the year 1890 were not yet forgotten; Argentina and Brazil, Portugal, Spain, and Greece had shaken confidence. Confidence in Australia was impaired. As in the merchandise balance, so here, too, the high figure of 1889 forms a turning point. The total emissions were, beginning with 1885: £77,900,000, £101,900,000, £111,200,000, £160,300,000, £207,300,000. £142,600,000. and £104,600,000; that is to say, in 1891 about one-half of 1889. The actual payments, however, were £77,900,000. £87,500,000, £93,600,000, £137,300,000. £167,800,000, £141,000,000, and £76,000,000. Only £22,000,000 of the emissions of £104,600,000 represent foreign loans, and in these £22,000,000 is included the Russian loan of £19,800,000, of which practically nothing was taken in England. All the leading loans of the colonies and of foreign countries closed the year with lower quotations, with the exception of Turkish and Egyptian values and the railway papers of the United States and Canada.

The position of England as creditor of the other nations has not been strengthened in 1891.

"A struggle for gold," says The Economist, "lasted from January to December, as the bank was obliged again and again to make a strong effort to induce deposits, but found it impossible to keep them, for no sooner had it built up its reserves than the market prices fell, and a new outflow began." One might have thought that the expected silver coinage of America might have produced some degree of quiet here, but the gold flowing out of America sought other ways, and in England there was still alive the remembrance of the insufficiency of the bank reserves that had come to light in 1890.

Toward the end of January, 1891, this remembrance found expression in a memorable speech delivered by Mr. Goschen at Leeds. "We were on the brink of a crisis," said the chancellor of the exchequer, "through which it might have been difficult for the soundest to pass unscathed, for the wealthiest to have escaped. It was a time when none who had liabilities or engagements to pay could say how they would pay them, if a condition of things were to continue under which produce could not be sold, under which bills could not be discounted, under which there appeared an absence of cash sufficient to discharge the liabilities of the general public. That was the position at home and I will tell you what was at stake. You risked the deposition of London as the banking center of the universe: you risked the supremacy of English credit; you risked the transfer of the business of this country to other centers, if such a catastrophe had occurred as you were on the eve of witnessing. I can not exaggerate the danger, the immediate danger to which this country was exposed at that time."[1]

Years ago Bagehot had pointed out how by the rising magnitude of the various amounts deposited the intensity of the obligations of the Bank of England had been enhanced, and the previous proportion of the reserve had become insufficient.[2] It now had become manifest that neither the available reserves of the joint stock banks, nor those of the Bank of England, were able to satisfy the claims. Mr. Goschen had comprehended the whole difficulty of the situation, and, after the storm had passed, was active in two directions. He induced the joint stock banks to publish far more frequently clear reports of the state of their liabilities, their assets, and their reserves, and urged the strengthening of the latter. At the same time he sought for a means whereby in the case of future stringency he might have larger amounts of gold on hand.

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[1] Mr. Goschen, Leeds January 28, 1891.

[2] Walter Bagehot, Lombard street, 6th ed., 1875, p. 302.

The publication of the reports of the joint stock banks was soon obtained. The strengthening of their cash reserves on the other hand has up to the close of the year made hardly perceptible progress, and it was evident that these banks intended to work with as little dead reserve as possible, and in case of need to leave the responsibility to the Bank of England. At the close of 1890 there were in these banks, against £125,300,000 in liabilities, only £16,000,000 in cash, and at the end of 1891 these figures were £120,600,000 and £16,600,000. The proportion therefore, despite all warnings, had merely risen from 12.9 to 13.7 per cent. Not improperly has this condition been called the "inbreeding of credit." It is significant that this condition existed in the gold land England, while at the same time in the silver land India the depositories were overfilled, and the rate of interest, owing to excess of money, had fallen in an unheard-of manner.

The second task of the chancellor of the exchequer, the strengthening of the Bank of England, turned out to be very difficult. Only on December 2, 1891, did the chancellor, in a speech in Merchant Tailors' Hall, make his intentions known more explicitly. One pound notes are to be issued, and in exchange for these part of the cash gold currency is to return to the vaults of the bank. The notes of the bank up to the present circulation of £38,000,000 are to be covered as heretofore by £16,500,000 in securities and £21,500,000 in gold. All emissions above £38,000,000 and up to £88,000,000 are to be backed by one-fifth in securities and four-fifths in gold. Above £88,000,000 there is to be full gold backing. Moreover, the bank is to be authorized in time of need to issue interest-bearing notes without regard to the backing just described. For such issue it will demand securities. This issue is not to take place before the gold stock has reached £30,000,000, and the profits of such extraordinary emission are to accrue not to the bank but to the state.

Mr. Goschen therefore wishes to return a large part of the circulating gold into the vaults of the bank. In lieu of it he gives paper heavily secured, all the more heavily the more the return of the gold progresses. He preserves the gold from wear, and he obtains some control over any outflow through exportation, through industry, purchase of the arbitrageurs, and the like. He facilitates postal remittances. He remarks in passing that the concentration of so large an amount of gold would also enable the nation more easily to put forth all its strength in case of a great war.

That is the precipitation of gold by paper.

It is by no means certain that these propositions will obtain the force of law. It is objected that the quota of gold which is to be replaced by securities will go abroad, and that the inflowing gold must remain as covering in the issue department, and therefore can perform no service to the banking department.

Into this question I am not called upon to enter. It was merely intended here to show how the far-seeing and conscientious chancellor of the exchequer, Mr. Goschen, conceives the situation of the world and the position of England, and how earnestly he is endeavoring to secure her circulation and to create for the Bank of England a strong and independent defensive position against future storms.

But the significant fact of the situation lies in this, *that gold in its metropolis assumes the defensive.*

CHAPTER VIII.

THE UNITED STATES.

PAN-AMERICANISM—THE RECIPROCITY CLAUSE OF THE McKINLEY BILL—BALANCE OF GOLD—ARTIFICIAL DIVERSION OF GOLD TO EUROPE.

While the branches of the wide British Empire show in more or less pronounced manner the striving after independent development, while, despite all improvements in the means of communication, distance is exerting its irresistible influence, and England, to repeat words used in England itself, "is preparing to become the proud mother of liberated daughters," in the United States on the contrary, under the leadership of a severed branch of the same Anglo-Saxon race, there appears more distinctly from year to year a mighty striving to extend the boundaries of the great Republic. But here it is areas locally united that are to be embraced by a common political bond. Since President Monroe, in 1824, discountenanced all European influence for the whole extent of America, down to the present day, that aim has been steadily pursued by the statesmen of the Republic.

In Europe there were smiles when in 1890 a "Pan-American Congress" met in Washington. It created a "Bureau of the American Republics," to the expenses of which every independent state of North and South America is to furnish a small contribution, and whose sole task is to promote commerce and means of communication within this wide area. At present the bureau is preparing an industrial exhibit in Quito, Ecuador. The plan of a railway line was drawn up which is to connect the United States through Mexico and Central America with the South, and some of the republics are already at work on their respective lines. A central bank for Pan-America is to be created, the metric system is to be generally introduced. Large subsidies for the establishment of direct fast steamship connection have been voted by Congress.

The series of measures in the field of tariff legislation which are designated as the McKinley bill was at first judged in Europe by the injurious effects which it has exercised on certain branches of European production, and the free-trade tendency of the English press has contributed to make us see only one side of those enactments. The tariff contains many high-protection features; but it lowers the duty on important categories of iron and steel, and from a great number of raw products it takes off the duty entirely. In section 25, for all material imported for the purpose of industrial elaboration, there is established, in case the product is exported, the right to a drawback of the duty (less 1 per cent)—that is to say, it extends the refining process to all home industries. Of the greatest significance, however, is the reciprocity clause in section 3. This clause authorizes the President to refuse free entry to sugar, molasses, coffee, tea, and hides from all states that impose upon the products of the United States such duties as seem unfair and unreasonable to the President.

This places at the disposal of the Government in particular the duty on sugar, which amounted to many millions. We will now see how this clause works.

First Brazil applied, in the midst of a political crisis, to secure for itself the market for coffee and sugar. The trade of the United States with Brazil had thus far been very passive. Already on April 1, 1891, a treaty was prepared by which the United States were allowed free entry for coal, machines, and railway apparatus, also a 25 per cent reduction on cotton and iron goods, leather and rubber goods. This, on the scale of the year 1889, affects £4,750,000 worth of English imports. During the nine months from April 1 to December 31, 1891, in comparison with the same period in 1890, the exports from Brazil to the United States rose from $52,800,000 to $79,200,000, and the imports from the United States from $10,000,000 to $11,600,000.

Cuba had to follow. That rich island produces sugar, coffee, and tobacco, but no flour. Thus far it had been cut off from the world by high protective tariffs and was connected with the mother country, Spain, by a tariff favoring that country. A recognized French professional journal tells that hitherto a barrel of flour was bought in New York and sent to Spain; there it was unloaded at Santander and reexported to Cuba. After paying all duties the barrel sold for $8.70 in Cuba; had it been sent from New York to Cuba direct it would, on account of the duty, have cost $11.46.[1]

In the face of the treaty with Brazil, the matter had become for Cuba a vital question; Spain was obliged to abandon the system she had thus far maintained. On July 1 and September 1, 1891, treaties with Cuba and Porto Rico went into effect, and hereafter American flour goes into Cuba free.

During the last four months of 1891, as compared to 1890, the exports from Cuba to the United States rose from $11,800,000 to $15,000,000, and the imports into Cuba from $4,800,000 to $7,000,000.

On September 1, 1891, the Republic of San Domingo followed suit.

Jamaica, too, could not remain behind. The British West Indies might have shared the advantages of the treaty between Cuba and the United States, in virtue of a most-favored-nation treaty between the West Indies and Cuba, but that clause becomes extinct on July 1, 1892. In the last days of January, 1892, the new agreement with the United States was concluded.

Against Haiti, Venezuela, and Colombia, which did not come to an agreement, retaliatory measures went into effect after March 15, 1892.

Mr. Blaine recently said in a speech, in reference to Canada, "You can not stand inside and outside of the union at the same time." These words are perhaps destined to be heard often in the next few years.

As Spain and England had to negotiate in the interest of the coffee and cane sugar of their colonies, so are other European states obliged to do for beet sugar. The fortunes of sugar might well supply an instructive theme to some future historian. He might show how cane sugar promoted the slave trade, how the discovery of beet sugar was caused by Napoleon's clôture, how artificial tariff legislation carried the center of gravity of the production to Europe until sugar became one of the tools by means of which American statesmen push forward to the partition of the earth.

He who wishes to become acquainted with the significance of the United States as a source of gold for Europe will have to take into consideration, first of all, the following simpler elements:

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[1] Jos. Chailley, La Situation écon. de Cuba; L'Economiste français, 11 avril, 1891, p. 455; also Andrew Carnegie, The McKinley Bill, XIX Century, 1891, I, p. 1030.

(*a*) *The gold production.*—If we confine ourselves to the last four decades, the only ones for which more accurate data are at hand, we find at the beginning of this period, up to 1851, an annual production of more than $60,000,000; up to 1859 that figure stays above $50,000,000; up to 1864, almost without exception, above $40,000,000; rises again during three years up to 1867 to over $50,000,000; remains up to 1871 above $40,000,000; till 1881, with oscillations (in 1878, once more $51,000,000), mostly above $35,000,000; and thenceforward above $30,000,000. We may say that in forty years it dropped down to one-half.

(*b*) *The silver production.*—This, at first quite inconsiderable, reaches in 1862, for the first time, $2,000,000; in 1865, $11,000,000; rises incessantly, and in 1872 reaches $23,000,000; 1874, $35,000,000; 1878, $45,000,000; 1885, $51,000,000; 1889, $64,000,000, and 1890, over $70,000,000. While the line of gold sinks, that of silver rises with extraordinary rapidity to large figures.

(*c*) *The increase of population*, and its demand for means of exchange, forms the third element. Forty years ago the United States contained 23,200,000 souls, and, at the close of each of the decades under consideration, 31,400,000, 38,600,000, 50,100,000, and, finally, in 1890, 62,600,000. Thus, while the gold production has fallen off one-half, the population has not entirely but nearly trebled. It is a curve rising rapidly and constantly, like that of the silver production.

(*d*) *The consumption of precious metals in industry.*—Though earlier reports on this subject can not be utilized, yet it may be assumed with tolerable certainty that the consumption, especially as regards gold, must have steadily risen with the number and the well-being of the population. The net consumption of gold, without old gold, was approximately in 1889 $13,900,000 and in 1890 $15,600,000, with a simultaneous production of $49,300,000 and $49,400,000.

Theoretically, the demand for metallic coin should have risen approximately in parallel line with the increase in population and of commerce; but the actual stock of coin was influenced by many incidents.

The following statements make no claim to numerical accuracy; they form a kind of balance of accounts in which many important secondary items are left out, and they are merely meant to indicate the general course of things.

The first decade, 1851–'60, shows the high figure of production of $551,000,000, and along with it the manifested gold exportation of $432,000,000, so that only $129,000,000 seem to have remained in the country. In 1848 the first finds had been made in California; for 1849 and 1850 there exist only estimates of the product of the washings, which certainly was very high, and it is possible that all figures for that early time, both for product and for exportation, lie below the reality.

In the following decade falls the profound disturbance of the economic development by the civil war. As yet the West of the great Republic is not connected with the East by any line of rails. There, beyond the wastes of the Great Basin, the Comstock lode is tapped, and there the gold circulation maintains itself, while in the East the bloody struggle of the North with the South is going on, gold leaves for Europe to procure the means of warfare and of living, and scarcity of gold ensues. In March, 1863, large issues of paper money begin to be made, and the mean rate of gold (100=par) is 146. In July, 1864, it reaches 285; about that time the Government debt has already risen to $1,740,000,000, aside from all emissions of the South. In April, 1865, at last the decisive victories of the North take place, while the debt has risen to $2,700,000,000; very slowly the rate of gold sinks, and in 1870 it is still 115.

But this very high rate of gold becomes a premium on the exportation of wheat, which begins already during the war under peculiar circumstances. Navigation on the Mississippi is closed, and the farmer reaches the sea only at heavy expense. And yet he competes with the East. "The exported wheat," writes Ronna, "is paid in gold; if the dollar stood at par, and the bushel of wheat was quoted in London at $1.25, and transportation to London cost $1, then the farmer in Iowa would receive only 25 cents. If, on the contrary, as in 1864, the dollar in gold is equal to $2.50 in legal paper money, then the farmer in Iowa, with the same market price in London, receives $2.12; that is to say, the premium on gold has raised the price of wheat for the farmer of that part of the country eight-fold. Likewise, the farmer in the State of New York, who pays only 25 cents for freight to London, received $1 with gold at par, and, with the gold value of the paper dollar at $2.50, he receives $2.87. In this way the farmer in Iowa, solely through the premium on gold, has received for the wheat exported abroad a proportionately more elevated price than the farmer of the East."[1]

Already, in 1863–'64, the exportation of wheat and flour was $59,000,000, and by the end of the decade it had reached $71,000,000. From 1868 onward there is observed, along with the outflowing stream of gold, an incipient movement of gold toward the United States. The rich land recovers from the war; large investments are made; the boom is coming.

The gold production in that decade was $474,000,000, the manifested importation of the last years $33,700,000, and the exportation $516,000,000; according to this the gold balance would close with a deficit of $8,300,000. But these figures are to be regarded merely as the crude expression of the general fact that during the war all the gold of the East went to Europe, and after the war recuperation took place. Everywhere now prevails the peaceable work of opening up the land. In the decade 1871–'80 the Government debt shrinks steadily; capital pours in from Europe; the network of railways is completed. In 1869 the first railway is opened that connects the East with San Francisco. At the close of 1872 97,000 kilometers of railways are in operation. The importation of gold increases, the exportation diminishes; from 1877 onward the balance of gold exchange is active; from that time onward the United States are no longer a source of gold for Europe, but Europe surrenders gold to them, although the highest productivity of the Comstock lode falls precisely within that time, namely, in the years 1876 and 1877.

The gold production of 1871–'80 was $395,300,000, the manifested exportation $314,700,000 and the manifested importation $190,800,000, so that, assuming these figures to be correct, the gold stock had risen by $271,400,000.

In 1880 the extraordinary wheat exportation of $226,000,000 had occurred. Accordingly, the decade 1881–'90 begins with the greatest known importation of gold; it was more than $100,000,000. In that year, therefore, the country had at its disposal, not merely its own production of $34,700,000, but also this large importation (net $98,200,000).

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[1] A. Ronna, Le Blé aux Etats-Unis de l'Amérique; 8vo, Paris 1880, p. 233.

But in order to obtain a correct view of the very complicated and instructive relations which, in the course of that decade, influenced the outflow and inflow of gold, we must, first of all, go back a little and cast a deeper glance into the development of the economic conditions of the country.

At the time of war, and of the great issues of paper money, high prices for the products of agriculture prevailed; at that time the farmer extended his enterprises and contracted mortgage debts at a rate of interest of 10 per cent and much more. When the value of the dollar rose, the producer's premium disappeared. But at the same time the heavy mortgage debt remained. The great Government debt has dwindled; the mortgage debt has risen by this time to $3,000,000,000. All these circumstances acted all the more oppressively because India, America's competitor in the market of the world, being a silver country, retained its premium. A system of protective tariffs, one-sided in favor of industry, also burdened the farmer's production, and complaints arose on all sides.

"In 1866," writes Count Kératry, "one could buy, for one dollar, 53 pounds of maize, 33 pounds of wheat, or 2½ pounds of cotton. In 1878 one might readily buy for the same price 93 pounds of maize, 50 pounds of wheat, or 9 pounds of cotton. * * * In justice it must be said that taxes have been lowered since the victories of the North over the South. In 1866 every individual paid on an average $50, which has since fallen to $25. But in order to raise these $25 the farmer at the present day must produce 300 pounds of cotton, or 33 bushels of wheat, or 75 bushels of maize, while formerly these same products were more than sufficient to pay the tax of $50."[1]

But let us listen to Mr. Rusk, Secretary of Agriculture. In his report for 1890 he writes:[2]

> The recent legislation looking to the restoration of the bimetallic standard of our currency and the consequent enhancement of the value of silver has unquestionably had much to do with the recent advance in the price of cereals. The same cause has advanced the price of wheat in Russia and India, and in the same degree reduced their power of competition. English gold was formerly exchanged for cheap silver, and wheat purchased with the cheaper metal was sold in Great Britain for gold. * * *

This view that the price and the exportability of the products of agriculture are in high degree dependent on the value of silver prevails in all the interested circles in North America. The statement spread through European newspapers that the movements in favor of raising the price of silver proceed from the so called silver kings of the West alone is erroneous, and is grounded on an exaggerated opinion of the influence of these persons. The causes of the silver movement lie far deeper.

The fall of prices in the rivalry with India and Russia, the burden of mortgages, the struggle with the carriers and the middlemen called into life an association of the farmers for self-help, which met for the first time on July 28, 1879, at Pollville, Tex., adopted the name "Farmers' Alliance," and soon assumed undreamed of dimensions. In 1886 it numbered already 200,000 members, and was able on its own account to take in hand the wholesale cotton business. In the following year it numbered half a million members in hundreds of sections. The Farmers' Alliance now entered into closer relations with the Knights of Labor in the industrial regions, and developed more and more into a machine acting in favor of labor and against capital. Its influence increased. Mr. Rusk sided with it in many important questions.

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[1] Cte É. de Kératry, La Crise agricole aux États-Unis; Revue des Deux Mondes, 1890, t. C, pp. 86, 88.
[2] Report of the Secretary of Agriculture, 1890, p. 4.

It is this vastly developed group that regards the further depreciation of silver as a disadvantage. As is well known, the Treasury at present purchases 54,000,000 ounces of silver per year, which were regarded as approximately corresponding to the home production, with the avowed intention by these continued purchases to keep up the price of silver. If these purchases were discontinued, the price of silver would fall, not only in America but all over the earth. If, however, the coinage of silver was made free, then any mine owner might bring a bar of silver of the metallic value of, say, $75 to the mint and receive back 100 coined dollars. It is true, therefore, that this free coinage would put an extraordinary profit into the hands of these persons, but it is an error to suppose that the great agrarian movement of the United States aims at nothing more than the enrichment of the mine owners.

The late Secretary Windom was undoubtedly right when he said in reference to the free coinage of silver, that before the swiftest ocean greyhound could land a new silver freight in New York, the last attainable gold dollar would probably be securely hidden away in private boxes and deposits. Hundreds of millions of dollars would disappear from circulation, and a general panic would ensue. Similarly, A. Carnegie was right when saying that whoever conjures up mischief in this domain, in order to draw his profit therefrom, is a twin brother to the criminal that causes the express train to be derailed in order to rob it.

Nevertheless, Senator Stewart, of Nevada, was right, too, when he said that gold is not sufficient for the human race; that legal enactments have their share in the fall of the price of silver, and that the silver standard is an advantage for the wheat culture of India against America.

"Some sort of money," continues Stewart, "the people will have; if there is not gold enough, they take silver." To this case I will return later on. In the meantime the struggle for gold has in this decade assumed, precisely in the United States, the most unexpected forms.

Despite all vicissitudes commerce has increased in an extraordinary degree. The exports of 1850 were valued at $134,900,000, those of 1890 at $845,300,000, those of 1891 at $970,500,000; the figures of the imports were $173,500,000, then $789,300,000, and $828,300,000. Year after year trade showed an enormous surplus. In 1891 the balance of trade closed with a surplus of exports of $142,200,000. Up to 1883 there was also a surplus in the exportation of gold; in 1884 $12,000,000 worth of gold was exported. From 1885–'87 gold once more flowed into the country; but, beginning with 1888, much gold was seen leaving for foreign countries.

The manifested values were the following:

[In thousands of dollars.]

GOLD.

	1888.	1889.	1890.	1891.
Importation	11,031	14,774	20,222	41,970
Exportation	34,615	50,917	20,654	78,088
	—23,584	—36,173	—432	—34,118
Production	33,167	32,967	32,845	33,481
Remainder	+9,583	—3,206	+31,413	—637

SILVER.

	1888.	1889.	1890.	1891.
Importation	29,591	25,940	22,425	18,192
Exportation	29,894	40,729	17,094	27,197
	—303	—14,789	+5,331	—9,004
Production	59,206	61,768	70,485	75,415
Remainder	60,903	49,979	75,816	66,111

Thus, in the same year, 1889, there were also exported considerable amounts of silver; the purchase of the higher amount of 54,000,000 ounces per year, that is to say about $70,000,000, by the Treasury, had begun only in autumn of 1890, whereas formerly the amount had been only 24,000,000 ounces per year. The drainage of gold, however, increased, and the Director of the Mint, Mr. Leech, has published accurate records concerning the outflow from New York, for the period from February 13 to July 24, 1891, during which this outflow amounted to seventy millions.

"An examination of the above table," says Mr. Leech, "discloses the very singular fact that of this large amount all but $9,300,000 was shipped when the rate of sterling exchange was below the point (about $4.886) at which gold shipments can be made without loss. The movement, therefore, must have been artificially stimulated by banks and bankers in Europe paying a premium on gold or making discounts to bill-drawers for cash remittances. This was the result of a condition of affairs very unusual in the mercantile world."[1]

Farther on it is said that as a rule the great banking houses in New York draw on their correspondents in Europe, at sight or on time, amounts corresponding to the volume of goods handled. The heavy losses of Europe in South America produced a stringency of credit, and called forth the effort to strengthen the gold reserves in England, France, and Germany, and the United States remained the only country from which gold was to be got. At the same time European banks pledged to the shippers interest from the day of shipment from New York. The Bank of England paid a premium on American gold, and when the crisis became more threatening it raised this premium from time to time. Large amounts of American securities were sent back in exchange for gold, wherein some owners no doubt were influenced by the fear of an approaching silver standard. The exportation of silver too was diminished by the Government purchases, and gold took the place of silver. Nowhere did any disturbance take place in consequence of the exportation; gold always flowed in from other parts of the country. It is evident that the central banks were not called upon, but that the withdrawal, the drainage, as it were, was distributed over different localities. In May, 1891, The Economist received news from New York that within the last few days $18,000,000 in gold had been shipped without any material diminution of the bank reserves. It was said that the fact had generally become clear in the end that the orders for gold were merely purchases of gold, in recent times with increasing loss for the purchasers.[2] When, finally, the current year showed a surplus of exportation of goods, amounting from July 1, 1891, to February 1, 1892, to over $180,000,000, and when gold still continued to flow out, it became evident that this outflow meant a calling-in of capital, which is stated, by the reports of experts, to have been induced, in the case of France, England, and Austria, under payment of premium on the part of the purchasers.[1]

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[1] Report of the Director of the Mint, 1891, p. 37.

[2] The Economist, May 30, 1891, p. 700.

From this an important lesson is to be learned. The reflux of its own certificates of indebtedness may, under given circumstances, entirely change the balance of payments of a state which is internationally indebted. Here we see a state showing a very high surplus of exports, and favored by nature in the highest degree, but which, at the same time, in the midst of peace, loses material parts of its gold circulation by foreign countries bringing securities on the market and assuming the costs of the loss in rate. True, a purchaser must always be found. But from this it results, furthermore, that with the capacity of a country to take up its returning obligations the danger to its metallic circulation rises simultaneously.

This capacity of taking up obligations may be produced in the natural way by increasing well-being and government credit, or by the prostration of the spirit of enterprise which facilitates the classing of rent, or by new forms of investment, such as postal savings banks; or it may be more or less forced by premium accorded by the foreign seller. The result is the same. Italy and Spain have had the same experience under different forms. Even at the present day American securities return home, and even after the first quarter of 1892 gold flowed to Europe in considerable quantities. The United States parted with a portion of their gold circulation, but by so much their indebtedness to Europe is less, and a few more threads of the web are broken which up to this day links the two continents.

In the case under consideration the outflow of gold may, furthermore, have been promoted by the uncertain monetary situation of the United States. Much silver is poured into the active circulation, and thereby evidently not only the drainage of gold coin is facilitated, but the payments into public depositories are made in large measure in silver instead of gold. Thus many circumstances urge toward a decision on the part of the United States.

In comparison with earlier statements it may be mentioned that the gold production of 1881–'90 was $326,800.000.

From all the figures here given of the monetary status of the United States the industrial demand is to be deducted. In this respect, too, it is to be remarked that it is always the manifested exportation only that is taken into account; many circumstances indicate that the true exportation of gold may be larger than the manifested exportation. No data whatever exist concerning gain of gold by immigration and loss of gold by voyages to Europe.

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[1] L'Economiste français, 19 Mars, 1892, p. 358; The Economist, March 5, 1892, p. 320, and elsewhere.

CHAPTER IX.

THE RECIPROCAL VALUE OF GOLD AND SILVER.

WEIGHT RELATION OF THE AMOUNTS PRODUCED—VALUE RELATION—PERMANENT DIVERGENCE OF VALUES—ENGLISH PARLIAMENTARY DEBATES OF 1890—UNALTERED PURCHASING POWER OF SILVER IN SILVER COUNTRIES—MEXICO—SITUATION OF THE UNITED STATES—ITS SIGNIFICANCE FOR EUROPE.

For a number of years the values of gold and silver, measuring one metal by the other, have been diverging more and more. Some circumstances tend to bring these values nearer each other, others act in the opposite direction, and the latter predominate.

Let us consider first the production. That of gold stagnates; its increase for 1891, which the estimates thus far made justify one in expecting, and which will perhaps be regarded by some readers as an extraordinary fact, is limited to 24,000,000 or 25,000,000 marks. The production of silver, on the other hand, rises incessantly; the loss due to the fall in price as compared with gold has been overcome in the ruling districts through the introduction of the furnace method and the fall in price would have to be yet far more considerable in order to exert a marked influence on the production.

But the figures of the product alone would up to this day hardly explain the divergence of values, for in 1850 and the years immediately following the figures of production were most unfavorable to gold as regards its price relation to silver, and yet no material changes occurred in the monetary valuation. As late as 1860 the weight relations of the output, gold being always=1, were 1:5.47; in 1870, 1:5.8: in 1880, somewhat over 1:14. During more than thirty years it stood below 1:15½, and if despite this fact the value of silver did not rise, but fell, that is to say, diverged from the value of gold, that shows that other circumstances besides those given by nature decided matters at that time. Now, the output of 1890 corresponds to 1:23.8, and that of 1891 may possibly fall to 1:24. But these figures are not more above the proportion of 1:15½ than those of 1850–1870 were below it. It is only because the legal relation of the Latin monetary union is not in force at this day that the figures of the relation of production contribute so directly to the divergence of the reciprocal value.

The increased demand for industry acts in the same direction. This increase pays no heed either to monetary needs or to production. The data at hand, however imperfect, seem to show that the demand for gold rises more quickly with increase in well-being than the demand for silver. But even assuming that the demand for the two metals increased in the same proportion, yet gold would constantly become dearer in relation to silver, for where there is excess of production there the apportionment for industrial purposes is easily accomplished.

In the same direction acts the rising demand for metallic coin in those countries which have based their currency, legally or in fact, on gold; and this rising demand relates not only to means of circulation but also to cash reserve, which is becoming so marked, for example, in England at this moment.

In the same direction the prices of the two precious metals are influenced by the continual armaments in Europe, by which gold in large amounts is withdrawn from monetary uses and is rendered immobile either in form of war funds or in other ways.

An extraordinary influence in the same direction has also been exerted by the moral depreciation which silver has undergone by a series of legislative measures, and especially by repeated sales of silver. This is to be regarded as one of the main reasons why at this day a large part of hoarding in India is done in gold.

On the other hand, there are circumstances which, being favorable to the price of silver, tend to bring the two values nearer to each other.

The first of these is the keeping open of the Indian mint to silver coinage. But the experiences of 1890 have shown that the inflow can not come too fast without bringing danger; that Asia's capacity to absorb silver is indeed very great, but that the diameters of the feeding channels are limited, and that a glut ensues as soon as these channels are taxed beyond the capacity of their diameters.

The second circumstance is the continued monthly purchase of 4,500,000 ounces of silver by the United States Government. This practice must be compared with what has been said from page 30 onward concerning the influence of the furnace method and concerning the tariff on fluxing ores, in order to perceive the contradictions it involves. It was intended by this purchase to take up the entire product of the United States. That product has for many years been rising, and, during the continuance of these conditions, has risen from 54,516,300 ounces in 1890 to 58,330,000 ounces in 1891.

The third circumstance is the rising demand for silver fractional currency in gold standard lands, which is connected with the higher standard of living of the less wealthy classes. This circumstance is permanent, but has not thus far much weight.

The fourth circumstance finally is the slight rise of the gold production for 1891, and perhaps for some of the subsequent years. But an increase of this production by about 9,000 kilograms is of no great moment at a time when the silver land India has absorbed an average of 35,000 kilograms in each of the last three years.

We may disregard transient influences, such as the relief of the gold market by the reflux of South American and Portuguese circulation.

If now the influence of the separating elements is balanced with that of the uniting elements experience shows the preponderance of the former. This is expressed numerically by the departure of the relation of prices from the ratio 1:15½. The mean ratio in 1866 was for the last time below the one just mentioned, being 15.43. In 1874 it reached 16.17; in 1876 already 17.88; in 1889, 18.40; in 1885, 19.41; in 1886, 20.81; in 1887, 21.15; in 1888, 22.01, and in 1889, 22.10. In consequence of the silver speculation preceding the deliberations in the United States the price of silver rose, the average for 1890 being 19.75. Under the influence of the present situation the ratio in 1891 was once more from 20 to 21.

For more than twenty years the values of the two metals have been diverging. This diverging movement was only interrupted in 1890, and then artificially. The figure for 1891, which is influenced by the American purchases, shows that the influence of these purchases has been overestimated, for it must be noted that that influence is distributed all over the earth, benefiting the silver mines in Australia, in Bohemia, or in Chile as much as it does those of the United States. By its expansion it loses its intensity. But the permanent causes of divergence have remained, and if the legislation of the United States left the present condition of affairs unchanged the ratio would rise from the figure 21 in 1891 as rapidly as it did after 1866. The whole effect would be expressed by a depression of the figure by little more than a unit, or not even so much, since the constant quantity of 54,000,000 ounces would be taken from an annually rising total of production.

Recapitulating what has thus far been said concerning production and relation of prices, we find:

(1) When from 1867 onward the ratio began to rise above 15½ that fall in value was not justified by the production, whose relative figure till after 1880 was below 15½.

(2) The weight relations of the production, that of gold being stagnant, have shown a constantly rising silver output, so that at present the figures for the production are nearly 1:24.

(3) The legal bond between silver and gold having been severed, the figure of the value relation, too, continued to rise. In 1889 it was 22.10. In 1890 it was depressed artificially, and is now rising again.

(4) Both the weight relation of the output and the value relation of the two metals show that the metals diverge more and more, and at the present day they are following similar lines.

So long as present conditions continue the difference of the reciprocal value of the two metals will increase from year to year. In other words, nature offers too little gold for present demands, while she offers silver in abundance. Thus the present legislative institutions are at variance with the conditions established by nature. Let us continue the supposition of an unchanged state of legislation. The figures show how quickly, especially since 1885, the value relation has changed and how slight the influence of the American purchases has been. Even now agriculture and in part industry in Europe are sorely at disadvantage against silver countries, such as India and Mexico. The most striking proof of this is the development of the Indian cotton spinning mills at the expense of Lancashire. The advantage of this situation accrues in England to the holders of interest-bearing notes, the productive value of which increases with the growing scarcity of gold.

Under these circumstances it is not surprising that already in April, 1890, the parliamentary debates on this subject assumed temporarily the embittered character of a struggle of labor against capital, in which employers and workingmen alike demanded the restoration of the value of silver.

The former president of the chamber of commerce of Liverpool, S. Smith, submitted 140 petitions, with 60,000 signatures, asking for the reëstablishment of the bimetallic system. He described the losses which labor was suffering by the one-sided enhancement of the purchasing power of gold. That, he said, was a tax which the drones of society levied on the working bees. It could not promote the welfare of society if the income of the idle, nonproducing class was raised at the expense of the toiling masses. One-half of this new burden was derived from the demonetization of silver. He called the attempt to depreciate silver a huge fraud on civilization. The contraction of the currency was merely in the interest of the rich, and was opposed to the interest of the whole nation. Sir Houldsworth, a cotton-spinner from Manchester, declared that it was incorrect that the wage worker found indemnification in the fall of the prices of the means of living for the loss in work or wages. That equalization either did not take place at all, or at most very late, and for that reason the wage workers were so heartily in favor of this petition, since they regarded these conditions as the root of the long years of losses. Mr. T. H. Sidebottom, a cotton-spinner from Cheshire, lamented the pitiable condition of all debtors in the country, who had assumed burdens under entirely different conditions. The producers were at this day the victims of a monetary vivisection. It was said that England is a land of creditors. But who had made her such if not the inventive talent and the industry of her inhabitants?

To this Sir Lyon Playfair replies that the participation in a bimetallic congress means that England, the great creditor of the world, is to invite the debtor nations to deliberate whether the debts contracted in gold since 1816 might hereafter be liquidated in depreciated silver. The new Latin Union would last just so long as England was willing to remain in the union, in order to be shorn like a gentle sheep by the debtor nations.

The secretary of state for Ireland, however, Mr. A. J. Balfour, separating loose from the government which held back, declared expressly that he too subscribed to the bimetallic heresy. It was wrong to imagine that all the inconveniences that had arisen since 1874 had sprung from the divergence of the values of the two coinage metals, but that divergence had a share in them. The first evil was a premium on Indian goods, due to the fall of silver; the second, the uncertainty of the rate of exchange; the third and greatest evil, however, was at present the lack of a stable currency for the whole world. Money was not only the measure of value for transactions from day to day, but also the measure for *deferred* payments, and if it was not stable it must harm either the debtor or the creditor. It was said that silver brought inflation. Inflation is bad. But if we are to suffer from one of the two we will rather suffer from inflation than from contraction. If to-morrow America was to decide that it will use no more silver, but place itself on a gold basis, where would the prices be? The history of the world's commerce teaches that in almost every question the practical men after all eventually give in to the theorists. An international agreement was possible and most desirable, but it could not be carried out against the prevailing opinion in the mercantile circles.

These words may serve as an example of the public temper in 1890. But the figure of the relation of weights of the output rises continually, and the figure of the value relation pursues the same course. Let us look at the rapid divergence in the years from 1885 on to the interruption by the American purchases and its present course. As soon as the figure 23.75 shall have been reached all gold obligations will have increased in value one-half, as compared with silver, and we are now very close to that figure. Then, in order to buy 1 kilogram of gold there will be needed, instead of 15½ kilograms of silver, one-half more, or 23.75 kilograms. But nothing at this day prevents that figure from rising to 31; that is to say, nothing prevents silver from falling to half its value in comparison to gold. We will leave unnoticed the pitiable debtors, be they individuals or states, and devote our attention merely to productive labor.

If this depreciation of silver, or appreciation of gold, were to occur all over the surface of the earth it might be, some think, that sooner or later, amid crises, equilibrium would be established. But this is not at all the case. In Asia silver would retain its purchasing power.

This phenomenon is already visible to-day. Mr. Goschen once said, replying to a deputation of bimetallists, that one of the extraordinary circumstances in this matter was that the rupee in India had not behaved in the way it should have behaved according to the laws of national economy. Its value had remained stationary, whereas it should have followed the price of silver in other lands, and that it was this perverseness of the Indian rupee that caused so many difficulties.[1]

In Europe it is customary to say that silver is depreciated. This the Indian will not admit. He says that gold in Europe has risen. The reason of the unimpaired purchasing power lies in this, that the great multitude of payments which are outside of the immediate influence of the world's prices and the small extent of external commerce in comparison to the internal commerce and to the mass of internal circulation form an element of inertia which checks the movement of prices and secures the purchasing power of the home metal for the internal commerce, that is to say, for the needs of the producer, for a long time or forever.

Having repeatedly mentioned the advantage which has in this way accrued to India we may now look at a second silver land, Mexico.

The Mexican silver ores, which for centuries have been furnishing the larger part of the silver stock of humanity, are, as has already been said, very diverse. Most of them, however, are poor dry ores, which make up for their low contents by their vast dimensions. Furnaces have begun to operate only in the last two years. Even at this day the largest amount of silver is obtained by amalgamation. But other hindrances had already been removed before the incipient transformation of refining methods. Since 1853 foreigners have been allowed to acquire real estate; the country has gradually become more accessible, and peace and personal safety have been introduced.[2]

This country, according to a kind communication from Mr. Gus. Struck, exported—

	1888 '89.	1889–'90.
Coined silver	$22, 686, 337	$23, 084, 489
Bar silver	6, 629, 262	7, 259, 958
Silver ore	7, 623, 589	6, 394, 662
Sulphurous silver	798, 556	803, 058
Gold in bars	349, 507	387, 610
Auriferous silver	233, 247	386, 871

At the same time the exportation of the other products of the country has increased in an extraordinary degree. "The reason," says Struck, "undoubtedly lies for the most part in the lower value of silver abroad and the purchasing power of this metal, which has here remained almost undiminished, for human labor in the field, and the stationary value for payment of ground rent. * * * The uneducated Mexican, who understands as good as nothing of silver depreciation, expresses this naïvely by saying that a peso is still worth 8 reales."

Aided by this premium on exportation, exports are rising from year to year, wealth flows into the country, and the textile industry begins to improve. "Silver, demonetized by Europe," says Struck, "will retaliate in so far as the great industrial countries of Europe, owing to the depreciated value of the white metal, caused by the action of these very countries, will never again supply cotton goods of extensive consumption to the Mexican and probably to other markets."[1]

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[1] The Perverse Rupee, in Rob. Barclay, The Silver Question, and the Gold Question, 3d ed., Manchester, 1890, pp. 99–124.

[2] W. Brockmann: Ueber die Betheiligung des Auslandes und speciell Deutschlands bei dem Bergwerksbetrieb in Mexico; Mitth. d. Deutsch. wissensch. Vereins in Mexico, I, 1890, S. 38–48.

Still more vividly, however, is the shifting of the situation to the disadvantage of Europe expressed by the circumstance that Mexico has utilized this prosperous time for great and permanent investments, which guarantee its productive power for the future and have assured President Porfirio Diaz an undisputed position in this land, formerly so disturbed. In his address to congress in April, 1891, he was able to point out that there are now in operation over 10,000 kilometers of railways and 31,700 kilometers of telegraph lines; that since the preceding August (1890) some 606 new mine concessions had been applied for; that the furnaces of Monterey and S. Luis de Potosi had been completed and others were in course of construction; that a public-school law was being elaborated. In a second address, September 16, 1891, the president announced the progress of vine culture and silk culture. Since 1883 the number of pieces sent by mail had risen from 5,000,000 to 125,000,000. Six new steamship lines had been conceded. The customs receipts in four years had risen 9,000,000 pesos.

It might be expected that the great exportation of precious metal would check the development of other kinds of exportation, but this is in no wise the case. While the average exportation of other products of the country in the preceding five years was 49,700,000 pesos, it rose in the last two years to 62,500,000 and 63,100,000 pesos.

The loss which Mexico suffers by the payment of interest on gold debt now amounts to about 2,000,000 pesos a year.

In this way Mexico repeats the same phenomena which were exhibited by the other silver land, India, to wit, unchanged purchasing power of silver in the country itself, hence premium to the advantage of the producer against gold lands, general economic advance, permanent opening of the country, but on the other hand difficulties of the financial administration due to foreign debt in gold.

All remarks concerning the present reciprocal valuation of the two metals depend on the supposition that the present state of legislation is to be maintained; but the present annual purchase of 54,000,000 ounces of silver by the United States Government is an entirely unnatural measure, which, like all similar contrivances, must in the long run lead to disagreeable consequences. That amount exceeds the demands of circulation; hence, as has been said, it facilitates the outflow of gold and causes more and more silver to flow into the Government depositories instead of gold. It was intended to correspond to the annual home production, but that production is already higher, and rises constantly.

President Harrison has announced that another invitation to the European powers for a monetary conference is contemplated, but would not for the present be issued. If a renewed attempt at an agreement failed he would, nevertheless, endeavor to secure employment for silver so far as practicable.

This is probably to be understood to mean that no material change is to be made before the approaching election of the new President. In the coming winter Europe will perhaps be once more brought face to face with the possibility of unification, and, if so, it will probably be for the last time.

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[1] G. Struck: Mexico und die Silberenwerthung im Auslande; same journal, pp. 1-13.

The old arguments ought not to be rehashed. You say the legal establishment of the reciprocal value of two metals is in itself a monstrosity; but you forget that in every State having the gold standard there exists together with it also silver money, which obtains its value by law. You say such a regulation can not be international, but you overlook how long the ration of 1:15½ was upheld and worked beneficently. We wish, say the London bankers, to receive our interest in gold and not in depreciated silver. But silver would no longer be depreciated the moment an agreement went into effect. Why, you ask, shall we cast such profit into the hands of the owners of silver mines, between whom and us there exists no sympathy? Remember that you are now casting the same profit into the hands of the owners of gold mines and washings. No man would lose by rehabilitation, and the whole world would be richer.

All these arguments fail to touch the true difficulty. That difficulty lies in the undoubted tendency of the two metals to diverge more and more. That divergence lies in the nature of the metals themselves, and no statesman and no law can alter the natural conditions that give birth to this tendency.

When, in 1849, gold poured into Europe in ever-growing quantities lawmakers had the courage to keep up the bridge over the great chasm, although the sentiment toward the gold miners at that time was similar to that now prevailing towards the owners of silver mines. As late as 1863 Stanley-Jevons characterized gold digging as an outrage on the human race.[1] Distinguished geologists, who knew the manner of these occurrences and their transitory nature, predicted that the chasm would close again, and it did close to open soon again in the opposite direction.

At present the situation is changed. The causes of such a gold stream are transient, but the conditions under which gold at this day is becoming rarer and those under which silver is becoming more common are permanent. This phenomenon, too, has been predicted.

And, let us ask further, if nature sets up difficulties so inexorably, is there no help in human affairs? In my opinion that help lies solely in the progressive opening up of Asia.

Ought, then, a congress of European statesmen to decide to accord to silver an increased value at variance with the conditions of its production, by general agreement, until the absorptive capacity of Asia has increased by, say, one-half, over that of the present day? I believe that this would be an exceedingly wise step in the interest of Europe; but from previous experience there is reason to doubt whether it will be adopted.

But in declining to do so, Europe must keep in mind that she places America face to face with a choice which, howsoever it may turn out, must in any case be fateful to Europe.

Let us take the case, in itself improbable, that America decides in favor of gold. President Harrison pointed out in a speech last year that the best method to force Europe to come to an agreement was to deprive it of gold. We learned (p. 76) that in that case the Indian government intends to follow America, without regard to the difficulties that may thence arise for Europe. What an enhancement of gold! Where would then be our prices? Mr. Balfour very pertinently asked already in 1890.

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[1] W. Stanley-Jevons: A serious fall in the value of gold ascertained, 8vo, London, 1863, p. 67.

People in Europe too easily forget that the gold standard exists there merely under the supposition that it shall not find many imitators. The great surpluses of balances of payment, and especially of goods, at this day lie not in Europe; they lie in India and in America. But the immediate moral effect of the adoption of the gold standard, even by only one of the two governments, would shake to their foundations all the economic conditions in European gold lands long before the actual withdrawal of gold took place.

This case, however, will not be further pursued because, in view of Harrison's last utterance, as well as in view of the temper of the agrarian and labor circles, as has been said, that case by itself is very improbable. Let us suppose, therefore, that the United States decide upon the free coinage of silver. Silver rises in value. Perhaps European governments, despite Windom's prediction, may succeed on that occasion to get hold of some fraction of the greatly overestimated gold circulation of America, even though it be at the increased price of silver, and thus to offer some transient relief to the gold market in Europe. The prices of the two metals converge. Silver is relieved of a part of the loss which it thus far suffered through lack of esteem, but it does not rise to 15½. This result is indicated by the ratio of production, the consumption of gold, and the experience of the slight effect of previous silver purchases on the price of the metal. A premium remains for silver countries, all the more because the causes continue which promote the scarcity of gold.

A pan-American standard may be established on the basis of silver alone. Not without reason does the silver party adhere to Mr. Blaine. *But the outcome of such a movement must be the partition of the earth.*

CHAPTER X.

THE FUTURE OF SILVER.

GENERAL ADVANCE OF COMMERCE AND PRODUCTION—PREMIUM AND INDEBTEDNESS—INCREASE OF TENSION—BIMETALLISM BECOMES A TRANSITION MEASURE—GROUPING OF STATES—JAPAN—SILVER IN CHINA—PARTITION OF THE EARTH—SILVER THE STANDARD OF THE FUTURE—UNCERTAIN POSITION AT THE PRESENT DAY—AUSTRIA HUNGARY—BUCKLE—CONCLUSION.

The second half of the nineteenth century marks a profound transformation in the life of nations. The planet has become smaller under the influence of improved means of communication. Not only the exchange of commodities has become facilitated and increased in an undreamt-of degree; the exchange of thought and the personal contact among the nations weaves a daily tightening network of common views and sentiments. Fractions of the white race, equipped with the experiences of their advanced mother race, have founded in distant continents, on virgin soil, colonies which now are blooming forth into rich and powerful states. In this they were often aided by great and unexpected finds of gold. Into old India European culture is breathing new life, and Japan heralds the entrance of the yellow race into the currents of the world's commerce.

Europe has been conscious of the leadership: that is a proud memory, but to-day Europe is obliged more and more to allow other continents to enter into equilibrium. They are honestly struggling onward to be the peers of Europe, and their claims must be recognized.

Europe, headed by Great Britain, has caused this blossoming of the world. Great Britain has been so liberal toward her colonies, on the domain of politics as well as of economics, that Thorold Rogers compared his native land with King Lear. But it is to the interest of Europe that this advance of other continents shall take place by way of natural progress, and not without the possibility of tranquil readjustment to new conditions. Instead of this Europe paralyzes and weakens herself by permanent armaments, and on the other hand has accelerated the course of things by granting a premium, arising out of difference in the quality of money, which gives an advantage to trans-oceanic production, and by the over-ready granting of trans-oceanic loans.

By the premium England herself has suffered most. Through the fall of prices English agriculture has received the last and heaviest blow; I am indeed inclined, in this very case of the Indian wheat, to adopt the views of Nasse and his partisans, ascribing the cause of the increased and cheapened exportation, besides the premium and even before it, to the opening up of the land: moreover, natural farming as yet prevails in many parts of India. But more striking and manifest is the rise of large-scale cotton spinning in India and the expulsion of Lancashire from the Chinese markets.

In fact a silver land finds it very difficult to buy of a gold land, and will always prefer to seek its necessaries in a land having the same standard.

In Bolton, near Manchester, the cotton manufacturers have just decided to work only four days in the week and to lie idle for three days. And while in Europe there is thus taking place a displacement of the conditions of production, for which comfort is vainly sought in the cheapening of a few of the means of living, a cheapening which, for the most part, vanishes in the retail trade, the chamber of commerce of Bengal at the same time passed a resolution which likewise complains bitterly of the present state of things. The confidence in the silver rupee is said to have sunk in business circles. No European capital is said to go any longer to India; the relations between the East and the West are said to be stagnant. The Indian government would either have to make a move toward international agreement, or, if that be unattainable, it would have to introduce the gold standard into India at once.

Thus the tension is increased, and both parties suffer.

The utterances of the Bengal Chamber of Commerce leads us from the commercial to the financial relations. Indebtedness in gold, especially when it rests on a silver land, manifestly rises from year to year with the divergence of values. While any economic gain due to the premium in the silver land is distributed among thousands of hands, in the figure of the interest which is due in gold, the burden finds concentrated expression, and it increases with every fraction by which the ratio rises. Many a statesman of an honestly toiling, upward-striving land watches with anxiety this figure which withdraws from his country undeservedly and inexorably a part of the fruits of its industry, and conveys to the bondholder unearned and unexpected gain. The crises of recent times have furnished abundant examples in which the paying capacity of a debtor country was exceeded and a good part of the capital was lost along with the interest.

Here I would like to return to a word of Balfour's already cited (p. 90). Money is said to be also the measure of value of *deferred* payments. The longer the period of deferment the graver must be under present circumstances the consequences of the progressive divergence of the values of gold and silver. The silver land is loath to buy in the gold land, but it must be yet far more careful not to incur long-time gold debt. The almost complete cessation of the emission of foreign loans in London in 1891 is a consequence of the experiences in South America, which, however, have become as instructive to all other debtors as they are to the creditors who have to bear the loss. That, and not the success of the gold régime, is at this day the reason of the cheapness of loan money.

Thus with the divergence of the values of the two metals all commercial relations are subjected to tension. But that does not trouble the goldsmith who melts down sovereigns, nor the metallurgist who runs the furnace with lead flux, nor does the nature of gold change for that. All assumption that with increasing price of gold the demand for gold ornaments or gold watches will diminish, or that with the fall of silver its production will decrease, suppose a difference in value which lies far beyond those figures which commerce is at all able to bear. On the contrary, all experience indicates that the group of the heavy metals, beginning with gold (19.253), is too rare to serve as the coinage metal for the increased demand, and that such a metal will be unable in the long run to draw the plow of human economy in equal team with a metal of a weight of only 10.474 (silver). It seems that the broad gap which nature has laid down between the heavy and the light metals can no longer be permanently bridged.

Hence any international agreement, though urgently to be recommended, will at this day much more than in former years, after the bond, unfortunately, has been prematurely severed, bear the marks of a transition measure. The object of this measure would be to prevent the partition of the earth till the moment, perhaps distant, perhaps near at hand, when Asia shall be more opened up, or when the world shall be ready to dispense entirely with the monetary services of gold.

Europe, I fear, is laboring under a grave delusion. The economy of the world can not be arbitrarily carried on in the mere hope that somewhere a new California and at the same time a new Australia may be found, as in 1849–1852, whose alluvial land may again give relief for a decade. The present small undulations in the figure of production however are without any further significance for the grand process.

Under these circumstances it might indeed happen that the results foreseen by Lexis would ensue, to wit, that even with a very high ratio within a bimetallic union a premium on gold would grow up in the course of years, called forth not by the demand for gold for exportation but by the demand for gold within the area of the league itself.[1]

But any condition is better than the present one, in which we are drifting on toward the partition of the earth into two trade areas. In order to survey such a condition we will arrange some of the most important states into groups.

The first group is formed by the gold lands, England with Canada, Africa and Australia, Germany, Scandinavia, and, by the actual condition of affairs, also the countries of the Latin Union. In this group are the creditors. No internationally indebted land has thus far maintained a free gold currency. Italy, within this group, has lost her gold currency.

The second group comprises states in which the standard relations are not defined. In each one of them different conditions prevail. The United States, by ordering the silver purchases, have assumed a mediating position, which, however, can hardly last long, or, should it continue, will finally lead to the loss of an ever-increasing part of their gold. Several States of South America have just passed through grave crises. The same is true of Portugal. Spain, too, is not without her difficulties. In Austria-Hungary a peculiar situation is produced by the fact that since the cessation of silver coinage the bank note based on silver did not follow the fall of its own basis, and that even the Government note circulating without cover is rated higher than the same amount in silver coin. Russia, too, possesses at this day merely a paper currency.

The third group finally is formed by the silver countries. I will mention Mexico, India, Japan, China. Not one of these countries is a creditor; some of them are debtors. All are in process of being opened up; some of them already present great surpluses of exports. They comprise the majority of the human race.

The economic blossoming of the silver states is very remarkable. India and Mexico have already been mentioned. Japan is climbing upward quite as vigorously. There, too, cotton spinning mills have sprung up. About the middle of 1891 there were already at work 377,970 spindles in 36 factories; since three years the number of factories had doubled, and that of the spindles had risen to more than fourfold. Over 17,000 people were employed in this industry. The Government has granted 2,250,000 yen (1 yen silver = 4.185 marks when silver is at par) in order to begin in 1892 the building of the first iron works. Trade is more and more passing from the hands of foreigners into those of native merchants. In 1890 Japan had a failure of the rice crop, and thereupon, and in part in consequence of that failure, passed through a financial crisis. But this does not prevent the exceedingly rapid introduction of all technical improvements, and, with the exception of that disturbance in 1890, trade, too, made great and regular progress. From 1885 to 1889 exports rose from 34,800,000 to 68,400,000, and imports from 27,000,000 to 64,000,000 yen. A successful colonizing movement is spreading from Japan over the islands of the Pacific. Especially is the sugar manufacture of Hawaii developing through Japanese labor. Two bills were recently laid before Parliament; one decrees the nationalization of all railways not yet in the possession of the state, and the other asks for an appropriation of 50,000,000 yen for the building of new railways.[1]

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[1] W. Lexis, Die Währungsfrage und die englische Untersuchungs-Commission; Conrad, Jahrb. f. Nationalökonomie, 1888, Neue Folge, XVI, p. 351.

China is not developing so fast; she takes up constantly growing amounts of imports, but as yet the products of the vast empire are not sufficiently mobilized for large exportation. But the demand for foreign products is rising in China also. Foremost is illuminating oil, of which, in 1891, 40,000,000 gallons were imported from America and 10,000,000 gallons from Russia. For 1890 we have the report of Mr. McKean. In that year alone the importation of illuminating oil had risen 50 per cent, window glass 58 per cent, matches 23 per cent, needles 20 per cent. The exportation of tea had fallen in consequence of Indian competition, that of silk was kept back on account of the higher rate of silver, and, moreover, exportation had suffered by floods in Chihli. The figures for 1889 and 1890 were for imports £26,200,000 and £32,900,000, for exports £22,900,000 and £22,600,000. The tonnage of the arriving vessels rose in six years from 18,000,000 to 24,800,000 tons.[2]

The fact that in the background of the silver lands there lies this ocean of human beings, must never be lost sight of. The money circulation in China is at present effected by silver, which is cast in bars either about 0.998 or 0.980 fine. The finer silver is cast into so-called "shoes" of 50 taels (67 ounces troy nearly) and the stamp of the producer is impressed on it; there is no other guarantee of fineness. Smaller ingots and hemispherical balls too are in circulation; they weigh about 6 ounces, and are deeply furrowed with a cold chisel in order to show the interior.[3]

In the ports foreign thaler pieces circulate, but the Chinese entertain the deepest suspicion against the fineness of the foreign coinage, and hence the coining of imperial Chinese silver pieces would certainly be of the greatest moment for the introduction of a more abundant circulation. The beginning of this has in fact recently been made. Since 1891 a silver piece of the value of a dollar is coined. One side shows the dragon, the other the inscription: "Current coin of Kwang-hsu." "Stamped in Canton." No one may refuse this coin or regard it as a foreign coin. This dragon dollar may perhaps in time acquire the same importance which the Mexican dollar acquired years ago for the commerce of the human race.

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[1] The critical report, which is worth reading, is reprinted in the Economiste français, 26 mars, 1892, p. 395.

[2] An extract may be found in the Economist, supplement to the number of June 13, 1891.

[3] H. F. Dawes, Silver Mining in Mongolia; Trans. Am. Inst. Min. Eng., 1891.

But let us return.

We assume the case that the United States, despite all warnings, establish the free coinage of silver. At one blow the Pan-American standard is established. All Asia joins in. The gold standard is limited to Europe and the English colonies, but without India. That, we said, is the partition of the earth. This idea of a partition of the earth into a silver sphere and a gold sphere has already come forward repeatedly. In the monetary conference of 1878 Mr. Goschen, as representative of Great Britain, stated that that country indeed clung to the gold standard, but that it suffered continual loss in India, in order there to keep open a drainage channel for silver. Might it not be feared that with the extension of the gold standard there would ensue a fall of silver, a rise of gold, and a corresponding fall in the price of commodities? The general double standard seemed to him a very Utopia, but the adoption of the exclusive gold standard was another, and to his eyes, an entirely wrong one.

It must be admitted that the representative of Switzerland, Mr. Feer-Herzog, merely drew the logical consequence of these words when he proposed the partition of the earth. Gold was to serve the advanced, silver the backward nations.

To-day, when the values of the two metals have gone so far apart, and when, with the continuance of present conditions, there is a prospect of further divergence, one may survey with greater distinctness the possible consequences of these ideas of 1878. Last year Prof. Milewski discussed this subject and showed that in part the partition has already taken place, how at the dividing line between the two areas the rate of exchange is constantly oscillating, and how this condition of affairs represents precisely a state of ceaseless unrest and uncertainty, as contrasted with the time of tranquillity which existed through a long period during the prevalence of the double standard.[1]

These are already the consequences of the first steps toward separation; as yet the great second group stands between the monometallic countries, the gold group on the one hand and the silver group on the other. A sharp dividing line is seen between England and India; here advantage to the bondholder, damage to labor; there advantage to production, loss for the government. Is there in this really a permanent advantage to the gold land?

But let us essay a few steps on the slippery path of conjecture.

The consequences, so far as they may be in a manner inferred, would first consist in a general improvement of conditions, so far as this can be effected by an approach of values of the two metals. This approach would be caused on the one hand by a rise of the value of silver, which, however, would not be too great, because the present purchases of the United States are already effecting an artificial rise; and on the other hand perhaps for the gold area by a greater outflow of gold into Europe (p. 94).

The more remote consequences, however, would be disastrous to the gold lands. In the great silver area, which comprises many states in need of money, there would occur perhaps at first inflation and irregularity; true, it must be confessed that even nowadays there are states with free silver coinage and yet without too great inflation. In order to bind the metal, more and more fully covered certificates would perhaps be issued instead of the partly covered notes. In any case the production of goods would make a great, perhaps too great, advance.

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[1] J. Milewski, Das Werthverhältniss zwischen Gold und Silver; Anzeig. Akad. Wissensch. Krakau, Januar, 1891.

In the gold area too there would at first be improvement, but soon there must ensue more and more contraction, fall of prices, injury to labor.

All obstacles now thrown in the way of commerce by tariffs would dwindle into insignificance compared to the barrier that would be erected by the partition of the earth into two solid areas of different money standards.

As the silver area comprises all zones, all natural products, and, in the United States, also all industries, a great independent economic unit would be constituted by the silver area. Exportation from the gold area would be rendered difficult, and yet the gold area would be dependent on the other for many products, as is proved by the balance of goods, already passive in a high degree even to-day, of Great Britain, Germany, and France. Silver capital would grow up in the silver area, and silver lands would borrow only silver capital. At the same time, however, in the whole silver area industry would continue as hitherto, consuming gold. That is the "walling-in of Europe."

Whether the United States will make this or some other choice is not now known, but in any case some deductions arise from the present situation.

First of all, it is certain that Europe, in case of refusal to enter into an international agreement, leaves America's hand free to enact measures which must exert the most profound influences on all commerce and on the money affairs of Europe herself.

Furthermore, it is certain that gold alone can never become the standard of the whole earth, but that, on the contrary, a time will come when it will have been entirely absorbed by industry. Let us not forget Soetbeer's results, according to which the entire monetary stock of the earth is smaller by almost one third than the production of the last forty years.

From this it follows, furthermore, that, *assuming that the system of metallic coinage continues to exist* (and I see as yet no practicable substitute), *silver will become the standard metal of the earth.*

The process is developing in this direction, but evidently more rapidly than I thought probable in 1877, for it appears that events of this kind which in other ages would belong to a more remote future are able, with the sensitiveness of the present commercial life and the perfection of present means of communication, to produce, as soon as they become recognizable, a potential downward grade which hastens their own advent.

Finally, it must be admitted that under the present conditions of production a bimetallistic agreement would bear the marks of a transition measure, though a beneficent one.

At such a time, when the final outcome may indeed be foreseen but the nearest course of affairs is altogether obscure and not without danger, a difficult task is incumbent on those governments which, not belonging to either of the two monometallistic groups, wish to protect their country against the uncertainty of the situation. At the present day they should not without necessity allow themselves to be drawn into this struggle. First of all, they should advocate an international agreement. If this is not reached, and if the United States decide in favor of gold, then there will ensue a struggle for that metal, in which those European states will be the first to lose their gold circulation which have debt certificates abroad, or which are otherwise economically weaker. If the decision is made in favor of silver, then a short interval may ensue in which the acquisition of gold would be cheaper than it is to-day. Even from the standpoint of those who, despite all the lessons of past years, still believe that some large political body ought to join the gold group, it would thus be necessary to warn against taking such a step before North America has spoken. Especially should this warning apply to Austria-Hungary, where, through the favor of external relations, through pacific policy, through the industry of the population and heavy taxation, the economic and financial conditions have been improved. The fruits of this improvement should not be abandoned to the arbitrament of a foreign government; the nation should quietly continue to strengthen itself.

When Buckle wrote that famous chapter of his history of civilization in England which treats of the influence exerted by the laws of nature on the institutions of human society, he could not yet have foreseen that it would be possible from the data given by nature to establish a prognosis for perfectly definite economic questions. He took into consideration the distribution of climates and the variety of the external conditions of life. But the comparisons change as soon as man employs a definite substance whose occurrence is subject to definite laws, and as soon as one is able to take into account the limits of occurrence of this substance, the parallax of quantity as it were, albeit within ever so wide confines. Gold is not the rarest metal, but it is too rare for the task which some would like to impose on it.

Already in his official preliminary works for the monetary congress of the United States for 1876, whose most important theses unfortunately seem to have attained publicity only much later, Del Mar, the chief of the Bureau of Statistics of the United States, put forth the view "that the probable exhaustion of all the great gold bearing alluviums of the world and the number and the possible wealth of the silver mines, through the effect of quantity and aside from other circumstances, would tend to widen the relation of value between the two metals, and in this way to render gold dearer and dearer, and silver cheaper and cheaper."[1]

The same result was reached at the same time through studies in Europe. Experience since then has confirmed them. The governments to whom belongs the leadership in these things may now ask themselves whether they have the strength and the will to draw the logical conclusions, or whether they will continue to judge a subject which concerns the whole earth merely from the standpoint of the immediate interest of their states; whether, in particular, in England the interest of the Government creditors is to remain the ruling interest.

China was able through thousands of years to draw upon itself for its requirements and to continue in isolation. Europe will not bear isolation from the other continents. *The question is no longer whether silver will again become a full-value coinage metal over the whole earth, but what are to be the trials through which Europe is to reach that goal.*

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[1] Alex. Del Mar: A History of the Precious Metals, 8vo, London, 1880, preface, p. VII.